MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for February, 1902, is based on reports from about 3,100 stations furnished by employees and voluntary observers, classified as follows: Regular stations of the Weather Bureau, 162; West Indian service stations, 13; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Railway Company, 96; Hawaiian Government Survey, 200; Canadian Meteorological Service, 33; Jamaica Weather Office, 160; Mexican Telegraph Service, 20; Mexican voluntary stations, 7; Mexican Telegraph Company, 3; Costa Rican Service, 7. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander W. H. H. Southerland, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San Jose, Costa Rica; Capt. François S. Chaves, Director of the Meteorological Observatory, Ponta Delgada, St. Michaels, Azores; W. M. Shaw, Esq., Secretary, Meteorological Office, London; and Rev. Josef Algué, S. J., Director, Philippine Weather Service.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or $10^h\ 30^m$ west of Greenwich. The Costa Rican standard of time is that of San Jose, $0^h\ 36^m\ 13^s$ slower than seventy-fifth meridian time, corresponding to $5^h\ 36^m$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now always reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

The month opened with a storm of marked intensity central near the Azores. At Horta, the barometer had fallen rapidly to 29.42 inches and a gale was blowing from the southeast. At 10:50 a. m. of the 1st, Lloyds, London, and Atlantic ports of the United States from Boston to Norfolk, were advised with regard to this storm, and informed that it would probably be encountered by west bound vessels which left European ports that day. During the next three days the center of this disturbance moved eastward and disappeared over southern Europe, its passage being attended by northeast gales between the fortieth and fiftieth parallels east of the thirtieth meridian. The barometer continued abnormally low, with prevailing gales, from the Atlantic coast of the United States eastward to southern Europe, until the 7th, with minimum pressure, 29.18 inches, at Horta, Azores, on the 5th; from the 8th to the 11th the presence of a deep barometric depression over the Canadian Maritime Provinces caused a continuation of stormy weather over the western Atlantic. Moving slowly eastward this latter depression reached the Grand Banks on the 13th; it apparently remained nearly stationary during forty-eight hours, with barometric pressure below 29.00 inches, and then moved north of east over mid-ocean in high latitudes. On the morning of the 13th advices were cabled Lloyds, London, and telegraphed to United States Atlantic ports regarding the character and probable course of this storm.

This disturbance was followed by another of exceptional strength, which passed northeastward along the Atlantic coast from Georgia to Nova Scotia from the 15th to the 18th, crossed Newfoundland during the 19th, and moving thence eastward was felt over the British Isles from the 22d to the 26th. On the 17th Lloyds, London, were notified of the position, character, and calculated course of this disturbance.

The storms of February in the United States first appeared either in the middle Rocky Mountain districts, or on the north Pacific coast; with one exception they passed southeastward over the Southern States, and thence northeastward over the Atlantic seaboard, where they developed great strength.

The most important of these storms in the Atlantic coast districts were those of the 2-3d and the 17-18th; they were attended on the middle and north Atlantic coasts by gales of unusual severity, and on the extreme north Atlantic coast by barometric pressure below 29.00 inches.

The severest storm of the month in the west and northwest districts appeared off the north Pacific coast during the 23d. By the 25th the barometer had fallen rapidly in the middle and north Pacific coast districts, with a minimum of 28.84

inches at Neah Bay, Wash., on the 24th. Gales of exceptional severity prevailed along the Pacific coast during the 23d, 24th, and 25th. The highest velocity reported occurred at Point Reyes, Cal., where, during a 5-minute period at 11 a. m. on the 25th, 98 miles an hour was recorded, with an extreme velocity for one mile at the rate of 103 miles an hour. By the morning of the 26th, the center of this storm had reached Wyoming, and during the succeeding twenty-four hours it passed southeastward to southern Missouri, where, on the morning of the 28th, the center of disturbance had moved northeastward over the upper Mississippi Valley, with minimum reported barometric pressure of 28.68 inches at Davenport, Iowa. It then passed northeastward over Lake Superior, with gradually diminishing energy. The Pacific storm just referred to caused the heaviest gales of the month in the Gulf and South Atlantic States.

A storm that appeared over extreme northwest Texas on the morning of the 22d, reached the lower Mississippi Valley on the morning of the 24th, and passing thence northeastward over the Atlantic coast States from the 25th to the 28th, was attended by heavy precipitation and high temperature, which resulted in destructive floods in the Apalachian Mountain districts.

Warnings were displayed well in advance of the gales of the month, and no severe storms occurred for which warnings were not issued.

The destructive floods in the Appalachian Mountain streams during the closing days of the month constituted a notable feature of February. A detailed account of these floods and of action taken by the Weather Bureau in issuing warnings in connection therewith will appear in the March REVIEW under the heading Rivers and Floods. Preliminary advices regarding flood prospects were issued from Washington on February 22 and 23, and on the morning of the latter date the following information was telegraphed Weather Bureau stations in Pennsylvania and West Virginia:

Warmer weather indicated for next two days, with conditions favorable for rain by Monday night. These conditions will be most favorable for a general breaking up of ice in the mountain rivers and streams of Pennsylvania, western Maryland, and West Virginia. Notify all interests concerned that danger from flood in low lying land is imminent.

The following extracts indicate the character and value of the warnings issued at stations of the Weather Bureau in Pennsylvania and West Virginia:

Pittsburg Dispatch, March 2, 1902.

WEATHER BUREAU'S GOOD SERVICE.

Seldom has the value of the Weather Bureau been more effectively demonstrated than during the present flood. The first warning sent from Washington headquarters was issued as early as last Sunday, February 23. The local bureau at once notified every one likely to be interested—railroads, trolley lines, police headquarters, and river operators—to expect very high water. This was followed by securing reliable and early reports from all points in the watershed, the Pittsburg observer remaining on duty continuously Thursday and Friday nights, receiving and distributing the latest reports. Thanks to this valuable and efficient service transportation companies, warehouses, commission merchants, and the river interests were enabled to save a considerable amount of property.

The police of the two cities also rendered splendid service. When, on Friday, the 28th, it was seen that there would be a 30-foot stage, the Weather Bureau promptly advised the heads of the police departments in Pittsburg and Allegheny, and officers were at once instructed to notify persons having residences or property in the districts in danger. As a result when the flood did come there was very little property in the cellars, and as far as possible that in danger elsewhere had been removed to safety. That the damage did not far exceed what it does is due to the early warnings of the forecast officials and the excellent work performed by the local office.

Parkersburg News, March 4, 1902:

The accuracy of the weather department's prognostications has been remarkable, and gives the public an added faith in the efficiency of that important and valuable branch of the Federal Government.

The following is an extract from a report made by the official in charge of the Weather Bureau office at Scranton, Pa.:

At 11:38 a. m., February 23, a flood warning was received from the Central Office; it was immediately given to the chief despatcher of the Delaware, Lackawanna, and Western Railroad, telephoned to the chief despatcher of the Delaware and Hudson Railroad at Carbondale, to the director of public safety of the city, and to the chief operator of each of the telephone companies, and the warning in full was printed on about 400 cards and mailed to as many addresses throughout this section of the State; copies were also delivered to all the local newspapers. By these means the warning was so widely disseminated throughout northeastern Pennsylvania that no one need have been ignorant of the effect of a rain or sudden thaw on the streams and rivers.

A rapid thaw did not occur until February 28, when a rain set in accompanied by high temperature which melted the snow and ice very rapidly, and caused alarming floods in all streams and rivers throughout this section of the State. The flood continued throughout March 1 and 2, and in the Susquehanna River during the 3d. At this time it is impracticable to obtain an accurate estimate of the damage done, but a fairly approximate estimate of the damage to city property, made by the director of public works, is $50,000.

BOSTON FORECAST DISTRICT.

The weather of the month was quite stormy, with sudden and decided changes in temperature, which were announced in the forecasts. The most notable storms occurred on the 2d and 17th. The first caused high southerly and westerly winds, while the storm of the 17th was accompanied by easterly winds of great force. The depression of the barometer in each storm was remarkably low. Warnings were displayed well in advance of the high winds, and no storm winds occurred for which warnings were not displayed. It is believed that shipping was greatly benefited by the warnings.—*J. W. Smith, Forecast Official.*

CHICAGO FORECAST DISTRICT.

The temperature continued much colder than usual during the first three weeks of the month, but the last week was marked by a rapid rise in temperature.

Warnings were issued well in advance of the cold wave which overspread the district the first part of the month, but similar warnings were not required during the remainder of the month.

Advisory messages were sent to open ports on Lake Michigan on the 2d and 3d for high northwest winds which occurred in connection with an advancing cold wave. No other storm of marked importance approached the Lake region during the month until the last few days, the western storms generally being diverted to the south of the district. On the 26th a storm of remarkable extent and intensity crossed the country from the Pacific coast and slowly approached the Lake region with constant and increasing energy. Storm warnings were sent to all ports with the advice to hold the vessels in safe harbors, and no casualty has been reported.—*H. J. Cox, Professor.*

NEW ORLEANS FORECAST DISTRICT.

The month was characterized in this district by a number of moderate storms, for which warnings were displayed. No storm occurred without warnings, and, as a rule, those issued were verified. Cold wave warnings were ordered in portions of the district on the 3d and 4th, and no cold waves occurred without warnings. Frost warnings were issued for the sugar and truck growing districts on the 10th, 16th, 20th, and 21st. Timely warnings were issued for all frosts that occurred.

The forecasts of temperature and rainfall proved satisfactory to interests which make use of such information.—*I. M. Cline, Forecast Official.*

DENVER FORECAST DISTRICT.

The weather conditions during February were very unsettled as a result of the development of a large number of low areas

on the middle-eastern slope. Strong anticyclonic conditions were notably absent, however, in more northerly districts, and and practically no warnings were issued or needed.

The precipitation, which was prolonged in the southwestern mountain region during the closing days of the month, was fully covered in the forecasts from twenty-four to thirty-six hours in advance. Great loss of life and property resulted from snow slides.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

The month, as a whole, was an unusually stormy one on the California coast, and in marked contrast to the earlier part of the winter. From a dry season there was a decided change in the other direction, and the month closed with a record of the heaviest rainfall for many years, insuring an ample supply of water for the growing season.

The month began with heavy frosts generally, which were followed by rain or light snow from the Tehachapi northward. On the 21st heavy rain fell generally over California. On the 24th warnings were sent to points in the Sacramento Valley that the rivers would rise rapidly Monday night and Tuesday. River warnings were continued until the 27th, and in every case verified. The most pronounced storm of the season was shown on the morning map of February 25. Pressure readings below 29.00 inches were recorded during the day. Southeast storm warnings were displayed on the entire coast of California and verified at nearly all points. At Point Reyes Light, Cal., the 25th opened with light rain and a terrific southeast storm in progress. The wind increased rapidly to 90 miles an hour at 10:15 a. m., and continued at that velocity until after 12 noon, very frequently reaching velocities of 98 to 100 miles an hour. A maximum velocity of 98 miles occurred at 11:15 a. m., at which time an extreme velocity of 103 miles was recorded, one mile being registered in thirty-five seconds. On the 25th warnings of high southerly winds in Nevada and a rapid rise in the Sacramento River were also issued.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

The weather in the North Pacific States during February was unusually stormy, with an excess of precipitation, and with temperature above the normal. Incoming vessels reported gales of hurricane strength near the American coast, which caused considerable damage to rigging, etc. On account of rough seas and strong head winds, many ships were kept off the mouth of the Columbia River or near the entrance to the Strait of Juan de Fuca two to three weeks before they were able to enter the harbors they sought. The Alaska steamers brought the information that southern Alaska was bare of snow and that the winter there had been unusually mild.

February storms passed across this district in a lower latitude than usual, and the month was a phenomenal one in many respects. Two severe windstorms swept between the coast and the Cascade Mountains, and both were successfully forecast. The other storms of the month passed across the district without causing unusually high winds. During the passage of a disturbance on the 25th, the extraordinary low barometer reading of 28.84 inches was recorded at Neah Bay.—*E. A. Beals, Forecast Official.*

HAVANA FORECAST DISTRICT.

On the 20th the following forecast was issued for the entire Island of Cuba:

12:30.—A storm of some energy is central in the Gulf of Mexico south-southeast of New Orleans. Brisk to high southeast winds will gradually veer and become northwesterly during Friday, with falling temperature.

Daily forecasts for the benefit of the marine interests were furnished the captain of the port of Havana during the month.—*W. B. Stockman, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	31, p. m*.	51	120	3, a. m..	36	87	2,200	2.5	880	36.7
II	2, p.m..	54	114	6, a. m..	38	75	2,800	3.5	800	33.3
III	7, a. m..	53	108	11 p. m..	30	90	2,300	4.5	511	21.3
IV	12, p. m..	50	97	16, p.m..	27	97	1,950	4.0	488	20.3
V	18, p. m..	47	96	22, a.m..	48	68	2,050	3.5	586	24.4
Sums							11,300	18.0	3,265	136.0
Mean of 5 paths							2,260		653	27.2
Mean of 18.0 days									628	26.2
Low areas.										
I	31, p.m*.	29	95	3, p. m..	48	68	2,300	3.0	767	32.0
II	4, a. m..	46	84	6, a. m..	47	54	1,500	2.0	750	31.2
	14, p.m..	37	75				1,400	1.3	1,077	45.2
III	12, p.m..	38	105	19, a.m..	46	60	3,250	6.5	500	20.8
IV	17, a. m..	51	120	22, p.m..	32	65	4,250	5.5	773	32.2
V	20, p.m..	53	114	27, a. m..	45	64	3,750	6.5	577	24.0
VI	27 p. m..	48	125	28, p. m..	46	87	2,550	3.0	850	35.4
Sums							19,000	27.8	5,294	220.8
Mean of 7 paths							2.714		756	31.5
Mean of 27.8 days									695	29.0

*February.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk, Forecast Division.*

RIVERS AND FLOODS.

During February the precipitation in the Atlantic and Gulf States ranged from 1 to 4 inches above the normal amount, and as a result all the rivers were in flood at some time during the month. On the Pacific coast the excess was far greater, ranging from 1 inch in the Plateau region to as high as 12 inches on the coast. The distribution of precipitation was such, however, that there were no floods except in the northern California rivers. At Portland, Oreg., unseasonably low water prevailed during the earliest days of the month.

The Mississippi system, except the Ohio, presented nothing of interest, although comparatively high stages prevailed below Cairo, Ill., owing to the moderate flood tide that came out of the Ohio. The crest of this flood passed the mouth of the Great Kanawha River on the 31st of January and reached New Orleans, La., on the 20th of February. The light rains of the last three or four days of January over the South Atlantic and east Gulf States had also materially raised the rivers in that section, and the heavy rain of February 1 rapidly brought them above the danger-line stages. Warnings were issued as usual and no great damage was done.

The Sacramento River was high a great portion of the month, owing to the excessive rains over its watershed. Warnings were given at the proper times for all portable property to be removed to high ground and for levees to be looked after. On the 13th there were four breaks in the levee between Princeton and Colusa, Cal., and a large wheat area was overflowed. Another rapid rise set in on the 23d, and warnings were once more widely distributed. All low lands south of Red Bluff, Cal., were overflowed, and the town of Tehama, Cal., was flooded. Levees were again broken at Colusa and 40,000 acres of wheat lands flooded, making the crop a total

loss. At Red Bluff a stage of 27 feet was made, the highest since the record flood of February, 1881. In the lower Sacramento Valley the damage was not so great.

The only change in the ice situation in the Mississippi and Missouri rivers was the extension of the frozen area to Cairo, Ill., with some slight intervals below St. Louis, Mo. At the latter place the river was frozen over during almost the entire month, while back of Cairo it was frozen from the 3d to the 25th, inclusive.

In the Ohio River ice was present in large quantities during almost the entire month. In the vicinity of Pittsburg, Pa., navigation was practically suspended from the 8th to the 23d, inclusive, on account of ice and low water. There was a gorge above the Baltimore and Ohio Railroad bridge at Parkersburg, W. Va., from the 3d to the 23d, inclusive. At Cincinnati, Ohio, ice compelled a suspension of navigation from the 9th to the 24th, inclusive, the ice practically disappearing on the latter date. At Evansville, Ind., navigation was suspended on the 10th and resumed on the 26th.

In the Hudson River, in the vicinity of Albany, N. Y., the ice situation became somewhat threatening during the last few days of the month, and merchants on the water front were advised to remove goods from cellars and low districts. In the Susquehanna River at Harrisburg, Pa., the ice began to move out on the 26th, but owing to warnings previously given, no damage of consequence was done. At Binghamton, N. Y., the ice in both the Chenango and Susquehanna rivers went out on the 28th on a fast rising tide.

The severe floods on the last two or three days of the month continued during the early days of March, and will be described in the WEATHER REVIEW for that month.

The highest and lowest water, mean stage, and monthly range at 134 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Divison.

The following summaries relating to the general weather and crop conditions are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau:

[Temperature is expressed in degrees Fahrenheit and precipitation in inches and hundredths.]

Alabama.—The mean temperature was 40.4°, or 5.9° below normal; the highest was 73°, at Mobile on the 27th, and the lowest, 11°, at Ashville and Florence on the 3d. The average precipitation was 6.52, or 1.18 above normal; the greatest monthly amount, 15.40, occurred at Union Springs, and the least, 2.71, at Newburg.

Heavy and excessive rains latter part of month caused damaging floods in larger rivers, overflowed lowlands, and washed uplands, leaving ground too wet for plowing, and delaying all farm work.—*F. P. Chaffee.*

Arizona.—The mean temperature was 49.4°, or 0.8° above normal; the highest was 90°, at Champies Camp on the 16th, and the lowest, 3° below zero, at Fort Defiance on the 2d and 3d. The average precipitation was 0.33, or 0.61 below normal; the greatest monthly amount, 1.80, occurred at Kingman, while none fell at a great number of station.

On account of scarcity of water for irrigation, wheat, barley, and alfalfa are making slow growth; almonds are in full bloom.—*Wm. G. Burns.*

Arkansas.—The mean temperature was 35.0°, or 6.4° below normal; the highest was 72°, at Elon on the 27th and at Pine Bluff on the 28th, and the lowest, 2° below zero, at Corning on the 15th. The average precipitation was 2.60, or 0.53 below normal; the greatest monthly amount, 4.63, occurred at Blanchard, and the least, 0.50, at Texarkana.

Wheat prospects continue unfavorable by reason of the poor start in autumn and damage by the freeze in December. The weather during February was cold, and there was considerable sleet, snow, and ice; these conditions instead of being detrimental to the crops, have, on the whole, been rather beneficial. Early sown wheat and oats are generally in fair to good condition, but the late sown have been seriously injured. Very little farm work has been done, on account of the dry and frozen condition of the ground. The weather has not been warm enough to bring forward the fruit buds, and as yet there has been no damage to the fruit; many trees were broken and damaged by the sleet and ice of the latter part of January.—*Edward B. Richards.*

California.—The mean temperature was 50.3°, or 1.7° above normal; the highest was 92°, at Tulare on the 16th, and the lowest, 6° below zero, at Bodie on the 3d. The average precipitation was 8.14, or 5.17 above normal, the greatest monthly amount, 44.35, occurred at Branscomb, Mendocino county, while none fell at Mammoth Tank, Needles, and Ogilby.

Warm weather and heavy rainfall during the month were very beneficial to growing crops. Wheat, barley, and grass were never in better condition at this date. The heavy storm in the central and northern sections about the 25th was one of the most severe on record and caused a rapid rise of creeks and rivers, with slight damage to grain. Early deciduous fruits were in bloom at close of month.—*Alexander G. McAdie.*

Colorado.—The mean temperature was 31.5°, or 5.3° above normal; the highest was 76°, at Lamar on the 12th, and the lowest, 28° below zero, at Wagonwheel Gap on the 2d. The average precipitation was 0.58, or 0.33 below normal; the greatest monthly amount, 2.46, occurred at Ruby, and the least, trace, at Fort Morgan and Grover.

The precipitation during February was very unevenly distributed and considerably below normal for the mountain region as a whole; in fact the deficiency was even more marked than for any of the four preceding months. East of the Continental Divide the storms did not make good the loss by evaporation and the same was true of the western slope prior to the prolonged storm that set in on the 25th and continued into March. This storm proved to be the heaviest of the winter in the southwestern part of the State. Over areas on the upper watershed of the Uncompahgre and the San Miguel the snowfall was reported the heaviest in twelve years, the duration of the storm considered. Snow slides were numerous and caused loss of life and property.—*F. H. Brandenburg.*

Cuba.—The mean temperature was 71.2°; the highest was 92°, at Soledad (Guantanamo) on the 7th and Nuevitas on the 28th; and the lowest, 42°, at Santa Clara on the 12th. The average precipitation was 1.74; the greatest monthly amount, 4.03, occurred at Cruces, and the least, trace, at Manzanillo.

Several copious showers fell in the western half of the island, but in the eastern half the rainfall was very light. Two cool waves were very generally felt—from the 11th to 13th and on the 18th and 19th; the average temperatures, however, were very seasonable. The rains were quite favorable for the tobacco crop; while they were too late to benefit the first cutting, they caused a vigorous growth of shoots, and in Pinar del Rio and Havana a very good second crop will be harvested; in Santa Clara conditions have also improved, but the rainfall was lighter there than in the two western provinces and more moisture is needed to assure the development of the sprouts. Growing canes were also much stimulated by the showers; cane planting and preparation of ground continued, but were by no means general, while grinding progressed uneventfully, with the exception of a few interruptions caused by heavy roads, which prevented carting. Small crops and pasturage were in good condition at the end of the month.—*W. B. Stockman.*

Florida.—The mean temperature was 54.4°, or 4.6° below normal; the highest was 87°, at Miami on the 2d, and the lowest, 21°, at Wewahitchka on the 10th. The average precipitation was 4.88, or 1.09 above normal; the greatest monthly amount, 10.57, occurred at De Funiak Springs, and the least, 0.90, at Flamingo.

During the early part of the month seeding was retarded by dry weather, and the continued low temperatures were unfavorable for vegetable growth. Cane was planted early in the month and the planting of corn and melons began during the second decade. Vegetables made fair progress, with moderate shipments. The orange crop was practically shipped by the 10th. Citrus trees and pineapples did well. Farm work is about two weeks late.—*A. J. Mitchell.*

Georgia.—The mean temperature was 42.1°, or 4.8° below normal; the highest was 83°, at Waverly on the 1st, and the lowest, 10°, at Washington on the 5th. The average precipitation was 7.43, or 1.98 above normal; the greatest monthly amount, 16.48, occurred at Woodbury, and the least, 2.34, at Savannah.

The coldest February since 1895, and one of the four wettest in the past eleven years. The continued cold was the main feature of the temperature; the minima were not unusually low. A great amount of snow was deposited in the extreme northern sections by the storm of the 14–

15th. A heavy rainstorm occurred on the 27-28th, during which 7 to 9 inches of rain fell in parts of middle Georgia. The excessive precipitation caused rapid river rises. Large and small streams went over their banks, and some damage was occasioned by the overflows. Farm work was delayed in the northern counties, but in some of the southern sections considerable was done. Fall-sown oats and wheat suffered from the prevailing temperature conditions. Fruit trees remained dormant and healthy.—*J. B. Marbury.*

Idaho.—The mean temperature was 32.5°, or 4.6° above normal; the highest was 62°, at Pollock on the 16th and at Boise on the 17th, and the lowest, 35° below zero, at Vernon on the 1st. The average precipitation was 2.45, or 0.66 above normal; the greatest monthly amount, 5.76, occurred at Ola, and the least, 0.53, at Swan Valley.

February opened with temperature below zero in all parts of the State, except the western valley districts. A decided rise of temperature occurred on the 4th, and the remainder of the month was unusually mild. Heavy precipitation, largely snow in the mountains, occurred in the southwest sections during the second and third decades. Plowing began about the latter part of the month throughout the southern and eastern counties, although the ground was very wet in the southwest sections. Grazing lands are free from snow, and grass has made good growth on the ranges.—*S. M. Blandford.*

Illinois.—The mean temperature was 20.8°, or 5.8° below normal; the highest was 62°, at Effingham on the 28th, and the lowest, 16° below zero, at La Harpe on the 3d. The average precipitation was 1.29, or 0.98 below normal; the greatest monthly amount, 2.72, occurred at Sycamore, and the least, 0.27, at Danville.

The weather during February was cold and dry until near the end of the month. Snow which fell the latter part of January, and which was augmented from time to time during February, afforded protection to wheat throughout the greater portion of the State. Good rains were general at the end of the month, and these added to the melting snow, saturated the surface of the soil quite thoroughly. There was a slight improvement in the condition of wheat during the month, and the prospects are quite favorable in the northern and central districts. In the southern districts prospects continue very unfavorable; grass did well in some localities and poorly in others. Peach buds are reported killed to a large extent in the central and southern districts.—*M. E. Blystone.*

Indiana.—The mean temperature was 21.5°, or 6.6° below normal; the highest was 59°, at Richmond on the 27th, and the lowest, 20° below zero, at Winamac on the 3d. The average precipitation was 0.99, or 1.76 below normal; the greatest monthly amount, 2.62, occurred at Hammond, and the least, 0.10, at Greensburg.

The temperature was abnormally low throughout the State, the maximum being but slightly above freezing in the north and central portions until after the 23d. During the same period the ground was generally covered with snow in the north and central portions and ice in the southern counties, and the condition of wheat was largely a matter of conjecture. After the 23d the snow and ice rapidly disappeared and at the end of the month wheat, although far below the average in appearance, showed marked improvement. Fruit was believed not to have been injured.—*W. T. Blythe.*

Iowa.—The mean temperature was 17.6°, or 4.1° below normal; the highest was 62°, at Humboldt on the 27th, and the lowest, 21° below zero, at Galva on the 2d. The average precipitation was 0.73, or 0.33 below normal; the greatest monthly amount, 2.39, occurred at Belle Plaine, and the least, 0.02, at Thurman.

The month was unusually favorable for stock feeding and ordinary farm operations. The ground was well covered with snow the greater part of the month, and winter grain and grasses suffered no material damage. The snow was mostly absorbed by the soil during the warm period at the close of the month.—*John R. Sage.*

Kansas.—The mean temperature was 26.9°, or 3.2° below normal; the highest was 74°, at Garden City on the 23d, and the lowest, 17° below zero, at Delphos on the 2d. The average precipitation was 0.78, or 0.27 below normal; the greatest monthly amount, 3.50, occurred at Moran, and the least, 0.02, at Leoti.

The month was cold, with insufficient moisture, but the ground has been fairly well covered with snow over the eastern half of the State, and decidedly well covered in the central-eastern counties. Wheat, though somewhat damaged by the cold in the central counties, is generally in good condition. Plowing has progressed in the central and southern counties, and oat sowing has commenced in the southeastern counties.—*T. B. Jennings.*

Kentucky.—The mean temperature was 27.9°, or 5.9° below normal; the highest was 69°, at Warfield on the 25th, and the lowest, 3° below zero, at Scott on the 3d. The average precipitation was 1.30, or 2.08 below normal; the greatest monthly amount, 3.60, occurred at Pikeville, and the least, 0.46, at Carrollton.

The severe weather of the month was detrimental to agricultural interests. The condition of wheat was bad at the beginning of the month. The heavy sleet which fell the last of January remained on the ground until nearly the end of February. The effect of this is uncertain; some claim that it was beneficial. Little farm work could be done except the stripping of tobacco, which was nearly completed. Stock did well considering the bad weather. Old orchards severely damaged by the sleet; young trees not hurt so much.—*S. P. Gresham.*

Louisiana.—The mean temperature was 47.6°, or 5.6° below normal; the highest was 81°, at Wallace on the 14th, and the lowest, 19°, at Lake Providence on the 3d, north Louisiana Experiment Station on the 4th, and Plain Dealing on the 16th. The average precipitation was 3.55, or 1.24 below normal; the greatest monthly amount, 8.24, occurred at Venice, and the least, 1.32, at Jennings.

The weather of the month was not favorable for agricultural interests. The temperature was below the average, and cool rains with sleet in the northern portion of the State retarded farming operations. Preparations for the cotton and corn crops are not well advanced. Plowing has, however, made good progress in some of the southern parishes, where corn planting has commenced. The bulk of the sugar cane was planted by the close of the month. The condition of both seed and stubble cane is good. Preparations for the rice crop have been pushed vigorously. Seeding has commenced and indications point to a large acreage. The oat crop is not large. The fall seeding is poor, while spring oats are generally up to good stands. Truck gardens are being planted.—*I. M. Cline.*

Maryland and Delaware.—The mean temperature was 27.4°, or 3.8° below normal; the highest was 68°, at Easton, Md., on the 27th, and the lowest, 17° below zero, at Sunnyside, Md., on the 20th. The average precipitation was 4.53, or 0.98 above normal; the greatest monthly amount, 6.85, occurred at Sudlersville, Md., and the least, 2.48, at Guard, Md.

The weather was decidedly wintry in its aspects until near the close of the month, with much ice in the waters and an ample snow cover on the land. Navigation was considerably interfered with. A general thaw on the 26th loosened the grip of winter, and the melting snows and heavy rains of that time produced flood stages in all water courses. Winter wheat was still very unpromising at the close of the month. Prospects remain good in the extreme west, and a few fields of early sown present a fair appearance, but the greater part of the crop is in unusually poor condition. The general snow cover helped the uplands, but ice and standing water caused damage in low lying fields. The severe sleet storm of the 21st and 22d caused great destruction to fruit and forest trees, especially throughout the interior parts of the section.—*Oliver L. Fassig.*

Michigan.—The mean temperature was 19.8°, or 0.6° above normal; the highest was 58°, at St. Joseph on the 26th, and the lowest, 26° below zero, at Humboldt on the 19th. The average precipitation was 1.06, or 0.90 below normal; the greatest monthly amount, 3.12, occurred at Chatham, and the least, 0.20, at Hayes.

In the winter wheat counties, February was dry and cold, with very little snow protection. At the close of the month the snow was practically all gone in the winter wheat counties, but correspondents quite generally report that very little winter killing had occurred, and that the present condition of wheat is fairly promising. Very little alternate freezing and thawing has occurred and little or no heaving. It should be remembered, however, that the wheat plant was small when the winter began, although quite healthy; it was seeded late, and for that reason did not get as much fall growth as usual.—*C. F. Schneider.*

Minnesota.—The mean temperature was 15.5°, or 3.0° above normal; the highest was 60°, at Morris on the 25th, and the lowest, 41° below zero, at Tower on the 9th. The average precipitation was 0.67, or 0.10 below normal; the greatest monthly amount, 1.70, occurred at Farmington, and the least, trace, at St. Cloud.

The cold weather of the latter part of January continued into the first decade of February, with the lowest temperatures generally from the 1st to the 5th, the minimum temperatures ranging from 11° below zero in extreme southern to 41° below in northern portions. The temperatures continued moderately low till the 20th, but from then to the end of the month there was mild weather. The maximum temperatures occurred for the most part on the 26th, and ranged from 43° to 60° throughout the state. Light snows fell at brief intervals till the 16th, after which there was generally dry weather till the evening of the 26th, when moderate rains fell throughout the state, which changed to snow on the 27th and 28th. Snow covered the ground till about the 23d, and in the timbered regions till about the 25th. The warm weather after the 20th, by melting the ice roads, seriously interfered with work in the logging regions, and by the 27th nearly all work was stopped. The snow of the 28th was probably beneficial by adding moisture to the soil. Very little farm work was possible during the month.—*T. S. Outram.*

Mississippi.—The mean temperature was 42.0°, or 6.3° below normal; the highest was 77°, at Batesville on the 28th, and the lowest, 12°, at Batesville on the 3d. The average precipitation was 3.63, or 1.20 below normal; the greatest monthly amount, 7.00, occurred at Swartwout, and the least, 1.95, at Hernando.

Owing to the uniformly low temperatures and to much cloudy, damp weather, the month was very unfavorable for farm work, and as a result practically nothing was accomplished over the northern portion of the State in the way of clearing the land, plowing, or sowing oats; but very little progress was made in plowing, planting, and gardening in the southern counties. Fall oats and wheat were either killed or seriously injured by the cold winter. Fruit buds remained dormant.—*W. S. Belden.*

Missouri.—The mean temperature was 23.9°, or 6.3° below normal; the highest was 72°, at Gayoso on the 28th, and the lowest, 17° below zero, at Fulton on the 3d and at Montreal on the 15th. The average precipitation was 1.51, or 0.75 below normal; the greatest monthly amount, 3.17, occurred at Mount Vernon, and the least, 0.14, at St. Joseph.

Over the larger portion of the State the ground was well covered with snow until the 22d, affording ample protection to winter wheat, which continued in good condition, except in some of the southern counties and in a few localities in the northeast section. In portions of the southern sections the ground was covered with a thick coating of ice during the greater part of the month which, it was believed, injured wheat to some extent. The melting snow, together with moderately heavy rains at the close of the month, materially increased the supply of stock water in the eastern and southern sections.—*A. E. Hackett.*

Montana.—The mean temperature was 24.9°, or 3.6° above normal; the highest was 66°, at Marysville on the 17th, and the lowest, 38° below zero, at Ovando on the 1st. The average precipitation was 0.86, or 0.15 above normal; the greatest monthly amount, 2.69, occurred at Troy, and the least, 0.05, at Fort Logan.

Cold weather prevailed during the first ten days of the month, followed by decidedly warmer over the central and east portion—*E. J. Glass.*

Nebraska.—The mean temperature was 23.6°, or 0.5° below normal; the highest was 65°, at Ansley on the 22d, and the lowest, 24° below zero, at Valentine on the 2d, at O'Neill on the 3d, and at Lynch on the 4th. The average precipitation was 0.39, or 0.29 below normal; the greatest monthly amount, 0.90, occurred at Ericson and Guiderock, and the least, trace, at several stations.

During most of the month winter wheat was nicely protected by snow, which melted after the 18th, leaving the ground moist and wheat in good condition. No unfavorable conditions, except on some high land, where snow blew off, but acreage injured is very small; crop generally very promising.—*G. A. Loveland.*

Nevada.—The mean temperature was 36.4°, or 4.8° above normal; the highest was 75°, at Lovelock on the 15th, and the lowest, 16° below zero, at Elko on the 3d. The average precipitation was 1.41, or 0.34 above normal; the greatest monthly amount, 7.19, occurred at Lewer's Ranch, and the least, 0.23, at Wabuska.

The weather was moderately mild and pleasant until the last week of the month, when heavy rains and snowfall were somewhat general throughout the State. The heavy snowfall in the mountains gives assurance of a good flow of water this summer. In the warmer valleys plowing was in progress the first three weeks of the month.—*J. H. Smith.*

New England.—The mean temperature was 23.8°, or 0.7° above normal; the highest was 65°, at North Bridgton, Me., on the 27th, and the lowest, 23° below zero, at Berlin Mills, N. H., on the 5th and other dates. The average precipitation was 3.77, or 0.33 above normal; the greatest monthly amount, 7.76, occurred at Chestnut Hill, Mass., and the least, 1.08, at St. Johnsbury, Vt.

The weather was characteristic of the month, with many stormy days and marked and sudden changes. Several storms of marked intensity passed over the district, causing rain and snow and severe gales. At the close of the month there was less snow on the ground than usual for the season. Owing to the light covering of snow, the ground in northern sections of New England is reported as frozen to an unusual depth. The weather of the month was not favorable for outdoor work.—*J. W. Smith.*

New Jersey.—The mean temperature was 27.4°, or 4.0° below normal; the highest was 62°, at Camden, on the 28th, and the lowest, 7° below zero, at Layton on the 6th. The average precipitation was 6.24, or 2.19 above normal; the greatest monthly amount, 8.44, occurred at Hanover, and the least, 4.29, at Layton.

The last half of the month was particularly noticeable for its two very destructive storms. The heavy snowstorm of the 17th drifted badly, blocking all trolley lines and bringing business to a standstill. Public schools and factories were closed, as walking was almost an impossibility. The average depth of snow was over 13 inches. The ice and sleet storm of the 21st and 22d was the most destructive of which we have a record. All telegraph, telephone, traction, and electric-light wires were prostrated for several days and thousands of shade and fruit trees were seriously injured by having the top branches broken off by the weight of ice. The rivers overflowed their banks and did great damage in the vicinity of Paterson, Bound Brook, and other points.—*Edward W. McGann.*

New Mexico.—The mean temperature was 39.5°, or 2.8° above normal; the highest was 92°, at Carlsbad on the 17th, and the lowest, 7° below zero, at Bluewater on the 2d. The average precipitation was 0.20, or 0.35 below normal; the greatest monthly amount, 0.80, occurred at Folsom and Raton, while none fell at six stations and only a trace at nine.

Fine and warm, excepting the last three days, which brought stormy, windy weather, preceded by a general thunderstorm. Very dry on the ranges, but stock not generally suffering.—*R. M. Hardinge.*

New York.—The mean temperature was 20.9°, or 2.2° below normal; the highest was 68°, at North Lake on the 28th, and the lowest, 26° below zero, at Axton on the 11th. The average precipitation was 3.07, or 0.10 above normal; the greatest monthly amount, 8.24, occurred at Salisbury Mills, and the least, 0.73, at Westfield.

February was a cold month with much snow and high winds, followed by a general thaw after the 23d, the ground being bare on the 28th, except in the colder sections. The weather was generally favorable for crops, and winter wheat, rye, grass, and fruit trees were in good condition, except in the southeast, where much damage to forest and fruit trees was done by the sleet storm of the 21st and 22d.—*R. G. Allen.*

North Carolina.—The mean temperature was 35.7°, or 7.0° below normal; the highest was 76°, at Kinston and Goldsboro on the 28th, and the lowest, zero, at Linville on the 13th. The average precipitation was 6.05, or 1.69 above normal; the greatest monthly amount, 10.26, occurred at Horse Cove, and the least, 3.01, at Mount Airy.

With the single exception of February, 1895, the month was the coldest February on record in North Carolina, and in regard to the amount of precipitation was surpassed only in February 1873 and 1899. Very little farm work of any kind was accomplished during the month. It is difficult to estimate the condition of winter wheat and oats on account of the slight signs of growth above ground, but all reports were unfavorable, and indicated an extremely backward condition of winter grains. While much grain was winter killed, it is thought that most of the roots have sufficient vitality left to give a moderate stand when growth starts. The heavy snow from the 14th to 17th, which remained on the ground in the chief wheat raising districts for more than a week, and the abundant moisture, with warmer weather at the close of the month, are thought to have greatly benefited the cereals. Some tobacco was seeded in beds and came up nicely.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 12.1°, or 5.5° above normal; the highest was 56°, at Power on the 21st and at Fort Yates on the 23d, and the lowest, 33° below zero, at Portal on the 4th. The average precipitation was 0.98, or 0.50 below normal; the greatest monthly amount, 3.60, occurred at Donnybrook, and the least, 0.21, at Bismarck.

The month was very favorable for the stock industry, cattle and sheep being able to graze on the ranges during almost the entire month. In the Red River Valley some ground was prepared for spring seeding, an unusual occurrance in February.—*B. H. Bronson.*

Ohio.—The mean temperature was 22.3°, or 5.7° below normal; the highest was 66°, at Cambridge and Hanging Rock on the 28th, and the lowest, 17° below zero, at Orangeville on the 14th. The average precipitation was 0.88, or 1.87 below normal; the greatest monthly amount, 2.61, occurred at Marietta, and the least, 0.17, at Vickery.

Wheat was well protected by snow during all cold weather. Many correspondents in southern and eastern portions report an improved condition of the wheat plant. There are no reports of winter killing and none that the roots have been upheaved. Reports from northwestern counties are less promising. The plant in many sections is small and weak and will be easily affected by adverse conditions. Peach buds reported killed in some sections. Other fruit trees appear uninjured. Stock continues in good condition.—*J. Warren Smith.*

Oklahoma and Indian Territories.—The mean temperature was 36.5°, or 1.5° below normal; the highest was 82°, at Hennessey, Okla., on the 26th, and the lowest, 10° below zero, at Pawhuska, Okla., on the 10th. The average precipitation was 0.39, or 0.79 below normal; the greatest monthly amount, 1.42, occurred at Hartshorne, Ind. T., while none fell Beaver, Okla.

Precipitation decidedly below the average amount and insufficient to protect the cereals in the ground. Wheat continues to hold its own, but is suffering for moisture; over some counties the early sown soft wheat was badly damaged by overfeeding and effects of cold, but the hard wheat was only slightly damaged; the late sown wheat is generally in fair condition. Rye and alfalfa are doing well. Plowing was delayed by hard condition of ground. Some early potatoes and some oats were planted. Stock continues to do well. Fruit trees are uninjured and have a good prospect.—*C. M. Strong.*

Oregon.—The mean temperature was 43.0°, or 4.2° above normal; the highest was 76°, at Jacksonville on the 16th and at Pendleton on the 18th, and the lowest, 14° below zero, at Joseph on the 1st The average precipitation was 8.87, or 3.84 above normal; the greatest monthly amount, 29.75, occurred at Buckhorn Farm (Kerby), and the least, 1.00, at Prineville.

The month was mild, with abundant rainfall. In the Willamette Valley and southern Oregon fall wheat and oats came through the winter in excellent condition and at the close of the month were well rooted, thrifty, and of excellent color. In eastern Oregon the condition of fall wheat was not so promising, although the bulk of the crop was thought to be in good condition. Stock wintered well.—*Edward A. Beals.*

Pennsylvania.—The mean temperature was 23.9°, or 4.6° below normal; the highest was 64°, at Aleppo and Pittsburg on the 28th, and the lowest, 24° below zero, at Saegerstown on the 14th. The average precipitation was 3.99, or 0.92 above normal; the greatest monthly amount, 7.43, occurred at Doylestown, and the least, 0.45, at Davis Island Dam.

February will be memorable for its extreme and continued cold; its severe wind, rain, sleet, and snow storms; the damage to property; loss of life; interruption to travel, transportation, telegraph, telephone, and mail service. The ground was well covered with snow and ice most of the month, and grain was probably well protected and in good condition if not smothered by the ice.—*T. F. Townsend.*

Porto Rico.—The mean temperature was 75.3°, or 0.6 above normal; the highest was 97°, at Cayey on the 23d, and the lowest, 51°, at Adjuntas and Corozal on several days. The average precipitation was

0.51, or 0.61 below normal; the greatest monthly amount, 4.76, occurred at Isabela, while none fell at Cidra.

Four consecutive weeks of hot, dry weather have resulted in considerable damage to growing crops and the paralysis of all farm work except the cutting and grinding of cane, for which the conditions have been ideal. This work is now general and is being energetically pushed. The yield is good and the grade of juice slightly improved. The young canes on low lands continue to grow, but those on the hill sides are at a standstill for lack of rain. The tobacco crop has suffered the greatest material damage from the drought, and without rain in the near future much of this crop will certainly be lost. Coffee continues promising, but a continuation of the dry weather will be injurious, as many of the trees have arrived at the flowering stage. Small crops and vegetables continue plentiful, but pastures are rapidly drying up and stock is suffering accordingly.—*E. C. Thompson.*

South Carolina.—The mean temperature was 40.6°, or 5.4° below normal; the highest was 77°, at Conway on the 22d and at St. George on the 27th, and the lowest, 11°, at Barksdale on the 6th. The average precipitation was 5.89, or 1.20 above normal; the greatest monthly amount, 10.51, occurred at Barksdale, and the least, 2.38, at Yemassee.

Unfavorable weather prevailed over the western and northern portions, where wheat and oats were injured by winter killing, and little or no farm work was practicable. Over the southeastern portion the conditions were favorable for general farm work, but were too cool for rapid germination and growth. In this section some fruit trees began to bloom at the close of the month.—*J. W. Bauer.*

South Dakota.—The mean temperature was 17.7°, or 2.0° above normal; the highest was 65°, at Oelrichs on the 21st, and the lowest, 30° below zero, at Mitchell on the 4th. The average precipitation was 0.53, or 0.03 above normal; the greatest monthly amount, 2.30, occurred at Fort Meade, and the least, trace, at Cherry Creek and Silver City.

The weather during the first decade was cold, with temperature considerably below normal much of the time, being a continuation of the cold period which set in on January 25. During the second and third decades it was much milder, with temperature generally above normal. Snow, with high northwest wind, fell over much of the State during the night of the 27th and on the 28th, in some localities being the most disagreeable storm of the winter, but the temperature was not low. There was some local loss of young, unprotected cattle reported on the ranges west of the Missouri River, due to cold weather and to interruption by snow to steady grazing. A little field work, such as clearing of ground and dragging, was done during the latter part of the month.—*S. W. Glenn.*

Tennessee.—The mean temperature was 32.7°, or 6.8° below normal; the highest was 68°, at Palmetto on the 27th, and the lowest, 1° below zero, at Silver Lake on the 14th. The average precipitation was 3.41, or 1.11 below normal; the greatest monthly amount, 6.72, occurred at Isabella, and the least, 1.68, at Wildersville.

The month was very unfavorable for winter grain. Continuous freezes and low temperature caused the poorest prospect for many years; many fields look entirely bare, and will be plowed up and planted in spring crops. The snowfall about the middle of the month afforded some protection, but came almost too late. At the end of the month, early drilled wheat was the most promising, while late sowings were in bad condition. Oats were mostly winter killed.—*H. C. Bate.*

Texas.—The mean temperature was 48.9°, or 1.5° below normal; the the highest was 104°, at Fort Ringgold on the 26th, and the lowest, 1°, at Tulia on the 2d. The average precipitation was 1.05, or 0.74 below normal; the greatest monthly amount, 3.86, occurred at Houston, while none fell at Fort Ringgold, Kent, Wichita Falls, and Sanderson.

The month was without special phenomena other than severe sandstorms in the western sections during the latter part of the month. Moderate rains fell in the eastern and coast districts; elsewhere the drought has continued with increased severity. The condition of wheat was somewhat improved in the central and southern portions of the wheat belt, but continues very unsatisfactory over the northern portions. Spring oats are being seeded; corn planting has become general in the southern portion and has begun in the central section; the crops need heavy rains. Preparation of land for cotton is well advanced, except where the ground is too hard and dry to plow. The first shipments of strawberries have been made, and shipments of other vegetables have been large throughout the month.—*Edward H. Bowie.*

Utah.—The mean temperature was 34.1°, or 5.3° above normal; the highest was 74°, at St. George on the 17th, and the lowest, 20° below zero, at Loa on the 2d. The average precipitation was 0.87, or 0.35 below normal; the greatest monthly amount, 2.54, occurred at Ranch, and the least, trace, at Emery and Terrace.

The month was the warmest February since 1886. Fall grain improved and is now generally in good condition. Peach buds have been damaged in Weber County, but elsewhere all fruit buds are still in good condition.—*L. H. Murdoch.*

Virginia.—The mean temperature was 31.2°, or 6.2° below normal; the highest was 72°, at Barboursville on the 22d, and the lowest, zero, at Burkes Garden on the 5th. The average precipitation was 4.77, or 1.40 above normal; the greatest monthly amount, 7.32, occurred at Roanoke, and the least, 2.20, at Stanardsville.

Crop growth was much retarded by the generally cold weather prevailing. Snow protection caused some local improvement, but outlook poor at close of month. The early seeded winter wheat which has formed the best portion of this year's prospective crop, was further injured. Winter oats and clover have also suffered severely.—*Edward A. Evans.*

Washington.—The mean temperature was 39.2°, or 3.1° above normal; the highest was 74°, at Pasco on the 15th, and the lowest, 18° below zero, at Hooper on the 1st. The average precipitation was 6.89, or 2.49 above normal; the greatest monthly amount, 26.63, occurred at Brinnon, and the least, 1.29, at Dayton.

The month was mild and open, and therefore favorable for winter wheat and the pastures of the western section. Much damage was done to wheat by the cold snap of the last week of January. About half will have to be resown; the remainder is not considered especially strong and healthy. Spring plowing and seeding have begun.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 26.7°, or 4.9° below normal; the highest was 68°, at Byrne on the 28th, and the lowest, 11° below zero, at Buckhannon on the 14th. The average precipitation was 3.20, or 0.15 below normal; the greatest monthly amount, 5.65, occurred at Byrne, and the least, 1.33, at Moscow.

From the 1st to 23d the ground was covered with sleet, ice, and snow; the depth of snow was sufficient to afford ample protection to wheat, rye, and oats, but the effect of sleet and deep freezing upon these crops is doubtful, and it is feared considerable damage was done in some counties. Farm work was absolutely suspended; orchards were considerably damaged by sleet, and peaches are thought to be killed in some localities.—*E. C. Vose.*

Wisconsin.—The mean temperature was 17.1°, or 0.8° above normal; the highest was 62°, at Knapp on the 27th, and the lowest, 30° below zero, at Osceola on the 2d. The average precipitation was 1.30, or about normal; the greatest monthly amount, 2.30, occurred at Port Washington, and the least, 0.22, at Hayward.

The weather during the month was very favorable to winter grains and grass; winter wheat shows good vitality and clover appears to be in good condition; there is but little frost in the ground in the southern counties and it is rapidly disappearing elsewhere; no farm work done.—*W. M. Wilson.*

Wyoming.—The mean temperature was 29.2°, or 6.9° above normal; the highest was 70°, at Rock Springs on the 18th, and the lowest, 27° below zero, at Fort Laramie on the 2d. The average precipitation was 0.48, or 0.27 below normal; the greatest monthly amount, 1.58, occurred at Border, while none fell at Hyattville, and only traces at Alcova and Daniel.

The mild weather of the month was very favorable for the stock interests of the State, and stock continues in good condition. Snow in the mountains was materially increased during the month, especially over the headwaters of the Laramie and Platte rivers. The unusually mild weather allowed some plowing to be done in several sections of the State.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

HAWAIIAN CLIMATOLOGICAL DATA.

By CURTIS J. LYONS, Territorial Meteorologist.

GENERAL SUMMARY FOR FEBRUARY, 1902.

Temperature mean for the month, 69.5°; normal, 70.4°; average daily maximum, 76.1°; average daily minimum, 64.4°; mean daily range, 11.7°; greatest daily range, 24°; least daily range, 5°; highest temperature, 79°; lowest, 52°.

Barometer average, 30.000; normal, 29.960; highest, 30.22, on the 4th; lowest, 29.72, on the 14th; greatest 24-hour change, i. e., from any given hour on one day to the same hour on the next, 0.27. Lows passed this point on the 14th and 22d; highs on the 4th, 16th, and 28th.

Relative humidity, 75 per cent; normal, 75; mean dew-point, 60.7°; normal, 62°; absolute moisture, 5.93 grains to the cubic foot; normal, 6.24. A most unusual drop of 20° in the dew-point took place from the 14th to the 15th.

Rainfall, 1.25 inch; normal, 5.70; rain record days, 12; normal, 16; greatest rainfall in one day, 0.44, on the 2d; total at Luakaha, 3.44; normal, 14.50; at Kapiolani Park, 0.27; normal, 5.20.

Rainfall data.

Stations.	Elevation.	Feb., 1902.
HAWAII.		
HILO, e. and ne.	*Feet.*	*Inches.*
Waiakea	50	3.56
Hilo (town)	100	2.92
Kaumana	1,250	10.33
Pepeekeo	100	4.07
Hakalau	200	.....
Honohina	300	.....
Laupahoehoe	500	9.89
Ookala	400	.....
HAMAKUA, ne.		
Kukaiau	250	3.52
Paauilo	750	.....
Paauhau (Mill)	300	2.84
Honokaa (Muir)	425	2.59
Kukuihaele	700	5.49
KOHALA, n.		
Awini Ranch	1,100	.....
Niulii	200	3.28
Kohala (Mission)	521	3.89
Kohala (Sugar Co.)	235	2.27
Hawi	300	.....
Hawi Mill	600	3.97
Waimea, c	2,720	4.91
KONA, w.		
Kailua	950	1.48
Holualoa	1,350	1.09
Kealakekua	1,580	1.29
Napoopoo	25	0.47
KAU, se.		
Kahuku Ranch	1,680	1.04
Waiohinu	1,000	.....
Honuapo	15	0.55
Naalehu	650	0.59
Hilea	310	0.80
Pahala	850	.....
Moaula	1,700	.....
PUNA, e.		
Volcano House	4,000	2.16
Olaa	.....	.....
Olaa (17-mile)	1,700	8.18
Kapoho	110	.....
Kalapana, se	8	.....
MAUI.		
Lahaina, w	.....	.....
Waiopae Ranch, s	700	0.46
Kaupo (Mokulau), s	285	2.84
Kipahulu, s	300	1.89
Hamoa Plantation, se	60	1.42
Nahiku, ne	60	.....
Nahiku (Nishwitz), ne	800	12.60
Haiku, n	700	3.42
Kula (Waiakoa)	2,700	2.59
Kula (Erehwon), n	4,500	3.64
Puuomalei, n	1,400	5.12
Paia, n	180	2.76
Haleakala Ranch, n	2,000	6.86
Wailuku, ne	200	2.54
Waiakoa	2,700	2.59
OAHU.		
Punahou (W. B.), sw	47	1.25
Kulaokahua, sw	50	1.22
Makiki Reservoir	150	1.54
U. S. Naval Station, sw	6	0.76
Kapiolani Park, sw	10	0.27
Manoa (Woodlawn Dairy), e	285	2.88
School street (Bishop), sw	50	1.49
Pacific Heights, sw	700	2.14
Insane Asylum, sw	30	1.02
Kamehameha School	75	0.94
Kalihi-Uka, sw	260	2.60
Nuuanu (W. W. Hall), sw	50	1.49
Nuuanu (Wyllie street), sw	250	2.14
Nuuanu (Elec. Station), sw	405	.....
Nuuanu (Luakaha), e	850	3.45
Waimanalo, ne	25	1.43
Maunawili, ne	300	2.05
Kaneohe, ne	100	.....
Ahuimanu, ne	350	2.04
Kahuku, n	25	3.34
Waialua, n	20	1.92
Wahiawa, c	900	.....
Ewa Plantation, s	60	0.64
Waipahu, s	200	0.70
Moanalua, sw	15	1.13
Magnetic Station	50	0.68
KAUAI.		
Lihue (Grove Farm), e	200	3.78
Lihue (Molokoa), e	300	4.27
Lihue (Kukaua), e	1,000	6.39
Kealia, e	15	4.26
Kilauea, ne	325	7.70
Hanalei, n	10	12.24
Haena	15	10.42
Waiawa, sw	32	2.21
Eleele, s	200	.....
Wahiawa Mountain, s	2,100	.....
McBryde (Residence)	850	8.21
Lanai	450	5.96
Delayed January reports.		
Ewa Mill	.....	0.10
Kipahulu	.....	2.53
Wyllie Street	.....	0.81
Moaula	.....	2.64
Pahala	.....	2.80
Hawi Mill	.....	3.16
Hilo Boarding School	.....	2.40

Water level in the artesian well fell slightly during the month from 33.95 to 33.80 feet above mean sea level. March 1, 1901, it stood at 34.37. The average daily mean sea level for the month was 9.89 feet on the scale, 10.00 representing the assumed annual mean.

Trade wind days, 6 (north-northeast one-half day); normal, 15; average force of wind (during daylight), Beaufort scale, 1.8.; cloudiness, tenths of sky, 4.9; normal, tenths of sky, 4.4.

Approximate percentages of district rainfall as compared with normal: Hilo, 40; Hamakua, 40; Kohala, 85; Waimea, 107; Kona, 42; Kau, 25; Puna, (?); Olaa, 60; Maui, 110; Oahu, 25; Kauai, 90. January and February have both been dry months.

Mean temperatures: Pepeekeo, Hilo district, 100 feet elevation, average maximum, 78.4°; average minimum, 65.5°; Waimea, Hawaii, 2,730 elevation, 71.8° and 59.0°; Kohala, 521 elevation, 78.5° and 64.2°; Waiakoa, Kula, Maui, 2,700 elevation, 75.5° and 52.1°; Ewa Mill, 50 elevation, 78.4° and 62.4°; United States Magnetic Observatory, 80.5° and 62.0°; W. R. Castle, 60 feet elevation, highest, 78°; lowest, 53°; mean, 69.3°. (The mean monthly temperature is reckoned at this office as 0.7° lower than the mean of maximum and minimum.)

Mr. Fleming, at the Magnetic Observatory, reports the mean dew-point, 9 a. m., 60.5°; 9 p. m., 60.2°; relative humidity, 67.8 and 75.

Dr. B. D. Bond, at Kohala, reports mean dew-point, 59.4°; relative humidity, 72.7.

Ewa Plantation, mean dew-point, 61°; relative humidity, 72.5.

Strong north to northeast winds prevailed during the first seven days of the month; from the 7th to the 27th westerly winds were unusually persistent, with a decided cold wave the 16th and 20th, having a minimum of 51° at sea level. Newspaper reports give ice at 4,000 feet elevation. On the night of the 27th a northerly gale set in which continued into March.

It is probable that Hawaii was on the south side of a very extensive disturbance which produced the storms of the first days of March on the mainland.

Earthquakes on Hawaiian Islands: 9th, 6:25 p. m.; 20th, 5:30 a. m., at Waimea, Kohala, and Hilo.

OBSERVATIONS AT HONOLULU.

The station is at 21° 18′ N., 157° 50′ W.

Hawaiian standard time is 10h 30m slow of Greenwich time. Honolulu local mean time is 10h 31m slow of Greenwich.

Pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Meteorological Observations at Honolulu, February, 1902.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m. Greenwich time, or 1:30 a. m. Honolulu time.							Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	30.07	73	69	79	72	66.5	76	.....	.....	4-6	30.11	29.95	0.00
2	30.08	69	67	77	72	66.0	78	ne.	4-2	8	30.16	30.07	0.11
3	30.15	72	64	74	69	63.7	78	ne.	3-6	8-4	30.17	30.07	0.44
4	30.15	70	64	75	70	60.0	65	ne.	6-4	5	30.21	30.15	0.13
5	30.14	70	62.5	74	68	62.3	75	ene.	6-4	8	30.22	30.12	0.05
6	30.08	69	62	74	68	59.5	69	ne.	5	8	30.18	30.08	0.28
7	30.04	69	62.5	75	68	58.3	65	ne.	4	4	30.11	30.01	0.04
8	30.05	62	60	77	67	59.7	70	ene-se.	3-0	4-0	30.08	29.99	0.00
9	29.97	59	57.5	76	61	59.0	76	s-n.	1-0	4-0	30.09	29.98	0.00
10	29.97	58	55.5	77	56.5	59.0	80	w.	1-0	0-6	30.06	29.97	0.00
11	29.91	61	58.5	75	56	56.5	75	w-sw.	1-0	0	30.06	29.90	0.00
12	29.89	71	68	76	58	60.5	75	w-sw.	1-0	0-10	29.95	29.86	0.01
13	29.88	66	65	78	69	67.3	84	wsw.	3-0	4-1	29.95	29.87	0.00
14	29.79	73	67.5	78	64	66.5	82	sw.	3-4	4	29.94	29.79	0.00
15	29.90	61	57	78	71	65.0	83	sw-w.	3-4	10-3	29.90	29.72	0.15
16	30.05	54	52.5	72	59	51.0	63	n.	3-0	2	30.11	29.90	0.00
17	30.03	64	61	76	52	55.3	72	n-sw.	0-1	0-8	30.12	30.02	0.00
18	29.91	65	64	74	61	61.0	79	sw.	1-0	8	30.04	29.92	0.01
19	29.98	54	52	76	63	56.5	66	nw.	4-2	6-0	30.04	29.90	0.00
20	30.05	56	54.5	74	53	53.7	75	sw-n.	0	0	30.09	29.97	0.00
21	30.00	62	60.5	74	54.5	55.7	75	s.	1-0	0	30.09	29.99	0.00
22	29.91	70	65	77	58	60.5	72	sw-w.	3-1	1-8	30.02	29.91	0.00
23	29.89	69	67	79	70	64.3	76	wsw.	3-1	4	29.93	29.85	0.00
24	29.91	72	67	78	66	66.7	80	sw.	3-0	7	29.98	29.86	0.00
25	29.95	69	66.5	79	70	65.7	80	sw.	2	8-3	29.99	29.89	0.00
26	29.96	70	67.5	79	66	63.5	75	w-n.	1-0	8-1	30.00	29.92	0.01
27	29.96	67	65.5	78	65	65.7	84	sw-n.	1-0	8	30.01	29.93	0.01
28	30.01	65	58.5	79	65	61.7	72	sw-n.	2-6	4	30.02	29.92	0.01
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.25
Means	29.989	65.7	63.0	76.1	64.4	60.7	75.0	.....	1.8	.....	30.056	29.950	.....
Departure	+.040	.....	.....	.....	.....	—1.3	0	.....	.....	.....	.....	.....	—4.45

Mean temperature for February, 1902, (6 + 2 + 9) ÷ 3 = 69.5; normal is 70.4. Mean pressure for February, 1902, (9 + 3) ÷ 2 = 30.000; normal is 29.960.

*This pressure is as recorded at 1 p. m., Greenwich time. †These temperatures are observed at 6 a. m., local, or 4.31 p. m., Greenwich time. ‡These values are the means of (6 + 9 + 2 + 9) ÷ 4. §Beaufort scale.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physical Geographic Institute.

[For tables see page 108.]

Notes on the weather.—As is usual during February, the weather was fine on the Pacific slope until about the 22d, when the northers began to blow with unusual force, bringing occasional showers far down on the southern slope of the Cordilleras. In San Jose the rather heavy rainfall of the 24th, the heaviest experienced during February since 1888, was quite a

surprise to most people. The pressure was generally high (except during the three last days), and the temperature slightly above the normal. On the Atlantic side the rainfall was moderate, with many warm, fair days. [See page 108.]

Notes on earthquakes.—February 5, 6h 20m a. m., slight shock, ENE–WSW., duration 2 seconds, intensity II.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Manuel E. Pastrana, Director of the Central Meteorologic-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the Boletin Mensual. An abstract, translated into English measures, is here given in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means are now reduced to standard gravity.

Mexican data for February, 1902.

Stations.	Altitude.	Mean barometer.	Temperature. Max.	Min.	Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Chihuahua	4,669	25.20	77.0	30.2	55.2	36	.....	e.	.....
Guadalajara (Obs. del Est.)	5,186	24.89	78.3	41.0	62.2	46	T.	nw.	.....
Guanajuato	6,640	23.62	79.7	38.8	60.8	43	.....	w.	.....
Leon (Guanajuato)	5,906	24.23	79.5	33.6	59.4	49	T.	ene.	.....
Mazatlan	25	29.92	77.2	58.5	67.5	77	0.04	nw.	.....
Merida	50	29.88	100.4	48.9	73.8	64	0.13	ne.	.....
Mexico (Obs. Cent.)	7,472	22.91	76.6	37.8	57.9	43	T.	ne.	w.
Monterrey (Sem.)	1,626	28.13	94.8	40.3	63.1	52	0.43	w.	.....
Morelia (Seminario)	6,401	23.89	77.9	39.2	59.4	57	0.03	wsw.	sw.
Puebla (Col. Cat.)	7,125	23.26	71.6	41.0	59.7	55	.....	ese.	.....
Puebla (Col. d Est.)	7,118	23.28	74.1	32.2	56.3	53	T.	ene.	.....
Queretaro	6,070	24.09	77.9	37.4	60.3	46	T.	w.	.....
Saltillo (Col. S. Juan)	5,399	24.68	73.6	39.4	56.1	54	0.04	nw.	.....
S. Isidro (Hac. de Gto.)	.....	.....	68.9	50.9	.....	.....	.....	w.	.....
Toluca	8,812	21.89	73.4	27.7	50.7	48	0.19	w.	.....
Zapotlan	5,078	25.03	82.0	43.2	62.2	53	T.	se.	.....

CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of Mr. Maxwell Hall, the following data are offered to the MONTHLY WEATHER REVIEW in advance of the publication of the regular monthly weather report for Jamaica:

Jamaica, W. I., climatological data, January, 1902.

	Negril Point Lighthouse.	Morant Point Lighthouse.
Latitude (north)	18° 15′	17° 55′
Longitude (west)	78° 23′	76° 10′
Elevation (feet)	33	8
Mean barometer (7 a. m)	29.971	29.967
Mean barometer (3 p. m)	29.927	29.925
Mean temperature (7 a. m)	72.7	.....
Mean temperature (3 p. m)	80.3	.....
Mean of maxima	82.9	.....
Mean of minima	71.2	.....
Highest maximum	88.0	.....
Lowest minimum	66.0	.....
Mean dew-point (7 a. m)	69.0	.....
Mean dew-point (3 p. m)	71.2	.....
Mean relative humidity (7 a. m)	87.0	.....
Mean relative humidity (3 p. m)	74.0	.....
Total rainfall (inches)	1.32	6.86
Average wind direction (7 a. m)	nne.	ne., ene.
Average wind direction (3 p. m)	nne.	nne., n.
Average hourly velocity (miles) (7 a. m)	11.6	12.3
Average hourly velocity (miles) (3 p. m)	12.5	15.4
Average cloudiness (tenths): 7 a. m. Lower clouds	1.8	1.9
7 a. m. Middle clouds	2.5	2.5
7 a. m. Upper clouds	2.0	1.2
3 p. m. Lower clouds	1.6	2.5
3 p. m. Middle clouds	1.6	2.5
3 p. m. Upper clouds	0.9	1.1

NOTE.—The pressures are reduced to standard temperature and gravity, to the Kew standard, and to mean sea level. The thermometers are exposed in Stevenson screens,

Comparative table of rainfall for January, 1902.

(Based upon the average stations only.)

Divisions.	Relative area.	Number of stations.	Rainfall. Average.	1902.
			Inches.	*Inches.*
Northeastern division	25	20	5.40	8.26
Northern division	22	55	3.34	7.69
West-central division	26	23	2.37	4.37
Southern division	27	31	1.70	2.39
Means	100	.....	3.20	5.68

In taking the average rainfall, Mr. Hall uses only those stations for which he has several years of observations, so that the column of averages represents fairly well the normal rainfall for each division, while the column for the current month represents the average rainfall at those same stations. The relative areas of the divisions are very nearly the same, and are given in the preceding table as expressed in percentages of the total area of Jamaica. The number of rainfall stations utilized in each area varies slightly from month to month, according as returns have come in promptly or not, but will not differ greatly from the numbers in the second column of the table.

Jamaica, W. I., climatological data, February, 1902.

	Negril Point Lighthouse.	Morant Point Lighthouse.
Latitude (north)	18° 15′	17° 55′
Longitude (west)	78° 23′	76° 10′
Elevation (feet)	33	8
Mean barometer (7 a. m)	29.967	29.959
Mean barometer (3 p. m)	29.912	19.918
Mean temperature (7 a. m)	73.4	76.8
Mean temperature (3 p. m)	80.6	82.4
Mean of maxima	83.3	.....
Mean of minima	70.7	.....
Highest maximum	86.0	.....
Lowest minimum	62.0	.....
Mean dew-point (7 a. m)	69.3	.....
Mean dew-point (3 p. m)	72.6	.....
Mean relative humidity (7 a. m)	87.0	.....
Mean relative humidity (3 p. m)	76.0	.....
Total rainfall (inches)	0.10	6.80
Average wind direction (7 a. m)	9.9	7.4
Average wind direction (3 p. m)	14.1	8.9
Average hourly velocity (miles) (7 a. m)	var.	var.
Average hourly velocity (miles) (3 p. m)	var.	var.
Average cloudiness (tenths): 7 a. m. Lower clouds	0.4	2.3
7 a. m. Middle clouds	5.0	2.2
7 a. m. Upper clouds	0.1	1.0
3 p. m. Lower clouds	0.0	1.1
3 p. m. Middle clouds	5.4	2.2
3 p. m. Upper clouds	0.8	1.0

NOTE.—The pressures are reduced to standard temperature and gravity, to the Kew standard, and to mean sea level. The thermometers are exposed in Stevenson screens.

Comparative table of rainfall for February, 1902.

(Based upon the average stations only.)

Divisions.	Relative area.	Number of stations.	Rainfall. Average.	1902.
			Inches.	*Inches.*
Northeastern division	25	21	4.91	5.43
Northern division	22	47	2.32	3.97
West-central division	26	21	2.71	1.92
Southern division	27	33	1.80	0.98
Means	100	.....	2.94	3.08

THE TERM INDIAN SUMMER.

By ALBERT MATTHEWS, Boston, Mass., dated December 15, 1901.

[Continued from January REVIEW.]

In 1851 Francis Parkman wrote: "The summer had long since drawn to a close, and the verdant landscape around

Detroit had undergone an ominous transformation. Touched by the first October frosts, the forest glowed like a bed of tulips; and all along the river bank, the painted foliage, brightened by the autumnal sun, reflected its mingled colors upon the dark water below. The western wind was fraught with life and exhilaration, and in the clear, sharp air, the form of the fish-hawk, sailing over the distant headland, seemed almost within range of sportman's gun.

"A week or two elapsed, and then succeeded that gentler season which bears among us the name of the Indian summer; when a light haze rests upon the morning landscape, and the many-colored woods seem wrapped in the thin drapery of a veil; when the air is mild and calm as that of early June, and at evening the sun goes down amid a warm, voluptuous beauty, that may well outrival the softest tints of Italy. But through all the still and breathless afternoon, the leaves have fallen fast in the woods, like flakes of snow, and everything betokens that the last melancholy change is at hand."[73]

In the same year Sir John Richardson said: "With regard to the progress of the seasons, the 'Indian summer,' as it is called, brought us three weeks of fine weather after our arrival in September."[74]

In 1852 Thackeray made one of his characters, who is supposed to be writing early in the eighteenth century, observe: "In our Transatlantic country we have a season, the calmest and most delightful of the year, which we call the Indian summer: I often say the autumn of our life resembles that happy and serene weather, and am thankful for its rest and its sweet sunshine."[75]

Writing of the climate of San Francisco, Dr. H. Gibbons said in 1855: "As regards the influence of the seasons on vegetation, the common order is reversed. The entire absence of rain in the summer months parches the soil, and reduces it almost to the barrenness of a northern winter. The cold sea winds of the summer solstice defy the almost vertical sun, and call for flannels and overcoats. When the winds cease, as they do in September and October, comes a delightful Indian summer. In November and December the early rains fall, and the temperature being moderate, vegetation starts forth, and midwinter finds the earth in lovely green and spangled with countless flowers."[76]

In 1855 Lieut. J. M. Gilliss, in his work on Chile, remarked: "All through March, and the larger half of April, unexceptionable fine weather lasts, though the atmosphere is less transparent by day than during the other seasons, and copious dews at night show its increasing relative humidity. About the close of the former month, or in the first half of the latter, there are usually from ten to fifteen days when it assumes that peculiar appearance between smoke and dry fog which is so notable at the 'Indian summer' of North America. During its continuance there is scarcely any wind; and, as the temperature after noon rises to summer heat, with its fresh southerly breeze, the air is more enervating than at the latter season. Here the resemblance between the two hemispheres ceases. Unlike the North American 'Indian summer,' of which, its continuity once broken, there is no return until the following year, the Chilean 'verano de San Juan'[77] is often interrupted by a renewal of the periodic winds with greater force, or by clouds; and after a day or two, there succeeds another interval when the air is tranquil and smoky."[78]

On October 30, 1856, W. H. Prescott wrote: "Our autumn *villeggiatura* has been charming, as usual,—the weather remarkably fine,—many of the days too *Indian-summerish*, however. The vegetation has been remarkably fresh to a late period, from the great rains, and then fading or rather flushing into a blaze of glorious colors, which, as they passed away, and the fallen leaves strewed the ground with their splendors, have been succeeded by wider reaches of the landscape and the dark-blue mountains in the distance."[79]

On November 8, 1857, Thoreau observed: "I see also the swamp pyrus buds, expanding sometimes into small leaves. This then is a regular phenomenon. It is the only shrub or tree that I know which so decidedly springs again in the fall, in the Indian summer. It might be called the Indian-summer shrub."[80]

On December 13, 1857, J. L. Motley wrote from Nice, France: "As I have never been in the tropics, I cannot get used to this constant flood of warm sunshine, cloudless and almost oppressive day after day, in what certainly are not generally considered the genial last weeks of the year. We have been here about six weeks, and there have been but two or three cloudy days, and those were warm rainy ones, all the rest as warm and as fine as our best days in early October. Warmer than those, because there is always a lump of ice stirred in at night into the American Indian summer."[81]

In 1857 Lorin Blodget said: "Where the autumn does not differ largely from the quantity of rain at other seasons, as in New England and farther northward, there are still intervals of the serene and beautiful weather so prevalent on the plains. The popular designation of *Indian summer* is universal, and it is held certain that one such period, of some days' duration, will occur in October in every year. In Canada this phenomena is in striking contrast with the weather which succeeds it; a few days of singularly mild, soft, and quiescent weather, attended with a dense atmosphere of smoke and dry haze, break up suddenly in a violent snowstorm, perhaps, with severely cold, clear weather."[82]

In 1857 Wilson Flagg remarked: "The season of the fall of the leaf commences, in general, about the twentieth of September, and varying with the character of the weather, continues until near the third week in November. It occupies a space of about two months, and may be divided into three periods. The first includes the time between the twentieth of September and the middle of the next month, when the maple, the ash, the tupelo, the creeper, the hickory, the beech, and the chestnut are in their full splendor. During this period the yellow, orange, and scarlet hues predominate in the tints of the foliage. The second period occupies a space of about two weeks from the end of the first, when the oaks have fully ripened their tints, and many of the trees just named have become leafless. This period is remarkable for a predominance of red, crimson, and purple hues in the color of the foliage; and it lasts until about the seventh or tenth of November. The third period commences with a succession of severe frosts, that destroy all the remaining tints of the forest, and change them into one uniform and monotonous brown. This period may be said to terminate with the early snows of winter, and is remarkable, in some years, for a series of warm days which have been called the Indian Summer. * * *

"As late as the second week in November we can seldom find one of our indigenous trees with any green leaves upon it, unless it be a young tree, under the protection of woods. The third period has now commenced; and the fall of the leaf is nearly completed. * * * But amid the general desolate appearance of nature, the scarlet berries of the prinos are conspicuous among the wild shrubbery; and the wych-hazel, clad

[73] History of the Conspiracy of Pontiac, p. 404.
[74] Arctic Searching Expedition, ii, 97. Sir John reached Fort Confidence, in latitude 66° 54', on September 15, 1848 (i, 335, 336, ii, 63).
[75] Henry Esmond, 1869, p. 452.
[76] In Ninth Annual Report of the Smithsonian Institution, pp. 235, 236.
[77] "St. John's summer. So named in the Argentine republic, though St. John's day is June 24. I never heard a Chileno designate it."
[78] The United States Naval Astronomical Expedition to the Southern Hemisphere, i, 90.
[79] Life, 1864, p. 380. Prescott was then at Pepperell, Mass.
[80] Autumn, 1894, p. 233.
[81] Correspondence, 1889, i, 206.
[82] Climatology of the United States, p. 233.

in a full drapery of yellow blossoms, stands ready with joyful hues to welcome the Indian summer.

"The Indian summer, which arrives during this third autumnal period, if it comes at all, is a brief period of warm weather, that sometimes greets our climate in November, after the fall of the leaf, and not as many suppose in October. It is probably caused by the sudden check to vegetable perspiration, by the fall of the leaves. * * * The warm spell that follows is the true Indian summer, and may last from five to eight days. During one of these spells of fine weather I have sometimes heard the crickets chirping merrily as late as the eighteenth of November." [83]

In 1857 Whittier wrote:

"And summer days were sad and long,
And sad the uncompanioned eves,
And sadder sunset-tinted leaves,

And Indian summer's airs of balm;
She scarcely felt the soft caress,
The beauty died of loneliness!" [84]

[83] Studies in Forest and Field, pp. 277–286. My attention was called to this passage by Mr. Henry C. Merwin, of Boston. What Flagg says of the foliage is worthy of remark. Some New England writers insist that the Indian summer comes late in November, and yet assert that the brilliant foliage is a chief feature of the season. But throughout New England the foliage has lost its brilliancy by the end of October or beginning of November. We apparently have our choice of two propositions: If Indian summer and the foliage at its height are coincident, then Indian summer can not come late in November; or if Indian summer comes late in November, then the Indian summer and the foliage at its height are not coincident. The error, which is not made by Flagg, is merely due to that looseness of statement already commented upon.

In 1872 Flagg returned to the subject, and it is curious to note certain changes in his views. He then wrote: "After the fall of the leaf is completed, then, according to tradition, comes the Indian Summer,— a fruitful theme both for poets and philosophical writers, but of which no one knows anything from experience. It may, after all, be only a myth, like the halcyon days of the ancients, the offspring of a tradition that originated with certain customs of the Indians, and which occasional days of fine weather in the autumn have served to perpetuate. It is certain that we have now in the Eastern States no regular coming of this delightful term of mildness and serenity, this smiling interruption of the melancholy days of autumn. We are greeted occasionally by two or three days resembling it after the first cool weather of October, and these short visits are in some years repeated several times. But a true Indian Summer, attended with all the peculiar phenomena described by some of our early writers both in prose and verse, rarely accompanies a modern autumn. It has fled from our land before the progress of civilization; it has departed with the primitive forest. I will, however, for the present, set aside all my conjectures of its mythical character, and treat it as a matter of fact.

"The Indian Summer, if such a season was ever known, was a phenomenon produced by some unexplained circumstances attending the universal wooded state of the country that existed for many years after its settlement. According to the most apparently authentic accounts, it did not arrive until November, nor until a series of hard frosts had destroyed all the leaves of the forest. It then appeared regularly every year. At the present time people know so little about it that they can not name the period of the autumn when, if it were not a thing of the past, it should be expected." (Woods and By-Ways of New England, pp. 315–319.)

Flagg goes on to say that "the true Indian Summer was a period of very mild weather, lasting from ten to fifteen days," and that "a warm period in October or December or January is not an Indian Summer, which belonged to November, and is only a relic of the past." In the same work Flagg makes some statements which the reader should be cautioned against accepting. He says:

"The whole continent, at the time of its discovery, from the coast to the Great American Desert, was one vast hunting-ground, where the nomadic inhabitants obtained their subsistence from the chase of countless herds of deer and buffalo. At this period the climate had not been modified by the operation of man upon the forest. It was less variable than now, and the temperature corresponded more definitely with the degrees of latitude. * * * It was then easy to foretell what the next season would be from its character the preceding years. Autumn was not then, as we have often seen it, extended into winter. The limits of each season were more precisely defined. The continent was annually visited by the Indian summer, that came, without fail, immediately after the fall of the leaf and the first hard frosts of November. This short season of mild and serene weather, the halcyon period of autumn, has disappeared with the primitive forest." (Pp. 3, 4.)

Is it possible that the writer had been favored with a special revelation which enabled him to speak with such assurance? If not, whence came this minute knowledge of the meteorological conditions which prevailed in America four centuries ago?

In 1859 John G. Palfrey observed: "Some of the aspects of nature are of rare beauty. No other country presents a more gorgeous appearance of the sky than that of the New-England summer sunset; none, a more brilliant painting of the forests than that with which the sudden maturity of the foliage transfigures the landscape of autumn. No air is more delicious than that of the warm but bracing October and November noons of the Indian summer of New England." [85]

In 1860 Prof. H. Y. Hind said: "In the afternoon of this day [16 October] a snow storm commenced which continued all night, and covered the ground with nine inches of snow. The thermometer was at the freezing point, but Mr. Mackenzie stated his conviction that the 'Indian Summer' not having yet occurred, the snow would soon disappear and we might have fine weather for ten days or a fortnight; a prediction borne out by the rapid disappearance of the snow on the following day, and the occurrence of beautiful weather with frosty nights to near the end of October. * * * Indian summer began on the 21st. The weather was warm, 'smoky,' and very delightful." [86]

In 1860 J. V. Ellis, speaking of New Brunswick, said: "As the season advances towards the autumn months, the summer still lingers, as if regretting to quit the scenes of beauty it has created—and then is produced the 'Indian summer,' a season of rare and exquisite loveliness, that unites the warmth of summer with the mellowness of autumn." [87]

About 1862 Thoreau observed: "Plants soon cease to grow for the year, unless they may have a fall growth, which is a kind of second spring. In the feelings of the man, too, the year is already past, and he looks forward to the coming winter. It is a season of withering; of dust and heat; a season of small fruits and trivial experiences. But there is an aftermath, and some spring flowers bloom again. May my life be not destitute of its Indian Summer!" [88]

Writing of Vancouver Island in 1865, M. Macfie said: "The protracted dryness of summer often imparts to the soil a parched appearance, but it is rather pasture lands than crops that suffer from this influence. The refreshing showers of autumn, however, lasting till the middle of November, clothe the grass a second time with verdure, which it retains till after Christmas. The later part of the fall is known as the Indian summer." [89]

In 1867 Prof. J. E. Willet wrote: "The season when it appears and the period of continuance of Indian Summer, seem, from the above, to be slightly different in different countries.

"In North America, it occurs in September, October, or November in different years. It is sometimes confined to one well-defined period of two or three weeks, as at Fort Confidence, in September and October, 1848. [See the extract dated 1851.] But more commonly it is extended through one-half or more of the autumn; presenting a series of smoky days, followed by a period of variable weather, to be restored again in full force for a short time, running thus interruptedly through two months or more. * * * Another point worthy of remark, is that there are individual days of smoky

[84] Mable Martin, iii, Poetical Works, i, 203.

[85] History of New England, i, 14.

[86] Narrative of the Canadian Red River Exploring Expedition, ii, 66, 68. Professor Hind also says: "Indian summer is a phenomenon of constant yearly occurrence and marked characteristics in the north-west. * * * The characters of Indian summer are more decided in the north-west than in the neighbourhood of Lake Ontario. Sounds are distinctly audible at great distances; objects are difficult to discern unless close at hand; the weather is warm and oppressive, the atmosphere hazy and calm, and every object appears to have a tranquil and drowsy aspect." (ii, 383, 384.)

[87] First Prize Essay: New Brunswick, As a Home for Emigrants, p. 18.

[88] Excursions, 1894, p. 448.

[89] Vancouver Island and British Columbia, p. 181.

weather, distributed through the whole year and undistinguishable from Indian Summer, in any particular, except the time of duration. Were they prolonged for a week or two, we should have Indian Summer in nearly every month of the year, and the phenomenon would cease to be regarded as peculiarly autumnal."[90]

In 1867 Dr. O. W. Holmes remarked: "The seasons had been changing their scenery while the events we have told were occurring, and the loveliest days of autumn were shining now. To those who know the 'Indian summer' of our Northern States, it is needless to describe the influence it exerts on the senses and soul. The stillness of the landscape in that beautiful time is as if the planet were *sleeping*, like a top, before it begins to rock with the storms of autumn. All natures seem to find themselves more truly in its light; love grows more tender, religion more spiritual, memory sees farther back into the past, grief revisits its mossy marbles, the poet harvests the ripe thoughts which he will tie in the sheaves of verses by his winter fireside."[91]

In 1869 J. W. Foster observed: "That delicious season known as 'Indian summer' is often prolonged into December, when a calm, soft, hazy atmosphere fills the sky, through which, day after day, the sun, shorn of his beams, rises and sets like a globe of fire. This peculiarity is observed as far north as Lake Superior, but is most conspicuous and protracted in Kansas and Missouri, but does not extend south, into the lower latitudes of the United States."[92]

In the same year Mrs. Stowe said: "When the apples were all gathered and the cider was all made, and the yellow pumpkins were rolled in from many a hill in billows of gold, and the corn was husked, and the labors of the season were done, and the warm late days of Indian Summer came in, dreamy and calm and still, with just frost enough to crisp the ground of a morning, but with warm trances of benignant, sunny hours at noon, there came over the community a sort of genial repose of spirit, or sense of something accomplished, and of a new golden mark made in advance on the calendar of life,—and the deacon began to say to the minister, of a Sunday, 'I suppose it's about time for the Thanksgiving proclamation.'"[93]

In 1874 A. Davidson and B. Stuvé remarked of Illinois: "*The Climatology of the State*, in common with other countries of the same latitude, has four seasons. * * * Autumn, with slowly diminishing heats, terminates in the serene and beautiful season known as Indian summer. Its mild and uniform temperature, soft and hazy atmosphere, and forests beautifully tinted with the hues of dying foliage, all conspire to render it the pleasant part of the year."[94]

In 1881 George Milner, an Englishman, remarked: "As autumn proceeds, we watch anxiously for that season of respite which in America is known as the Indian Summer, and in our own country as the Little Summer of St. Luke—a time of warmth and stillness and beauty, in the midst of which we would fain linger. * * * The eighteenth of October is the festival of St. Luke, and it is on that day, or near it, that the serene weather usually arrives."[95]

In 1882 the late J. A. Symonds wrote: "If I am doomed to decline now, I can at least say that in the five years since I came here [Davos, Switzerland] dying, I have had a very wonderful Indian summer of experience. The colours of life have been even richer, my personal emotions even more glowing, my perception of intellectual points more vivid, my power over style more masterly, than when I was comparatively vigorous."[96]

[90] American Journal of Science, Second Series, xliv, 342.
[91] Guardian Angel, 1891, p. 164.
[92] The Mississippi Valley, p. 205. Cited in the Century Dictionary.
[93] Oldtown Folks, 1896, i, 386, 387. Cited in the Century Dictionary.
[94] Complete History of Illinois, p. 20.
[95] Country Pleasures, pp. 232–237.
[96] Biography, 1895, ii, 203.

In 1883 Dr. Holmes said: "In October, or early in November, after the 'equinoctial' storms, comes the Indian summer. It is the time to be in the woods or on the sea-shore,—a sweet season that should be given to lonely walks, to stumbling about in old churchyards, plucking on the way the aromatic silvery herb everlasting, and smelling at its dry flower until it etherizes the soul into aimless reveries outside of space and time. There is little need of trying to paint the still, warm, misty, dreamy Indian summer in words; there are many states that have no articulate vocabulary, and are only to be reproduced by music, and the mood this season produces is of that nature. By and by, when the white man is thoroughly Indianized (if he can bear the process), some native Haydn will perhaps turn the Indian summer into the loveliest *andante* of the new 'Creation.'"[97]

In 1884 Professor Huxley observed: "We must begin to think seriously about getting out of the hurly-burly a year or two hence, and having an Indian summer together in peace and quietness."[98]

In 1886 Dr. C. C. Abbott remarked: "October 30. * * * A few warblers congregated in the big locusts in the yard, and offered a chance to take an observation from within doors. There were black and white tree-creeping warblers, a black-throated blue, and two myrtle birds. These gave me hopes that an autumn flight of warblers may wind up the month, or be the prominent features of November's Indian summer."[99]

In the same year Bela Hubbard wrote: "Hard frosts which put a period to vegetable growth, come from about the first to the end of October, being very variable, but such always precede the period which has been designated *Indian Summer*.

"This soft season so full of poetry, if not of romance, is among the very uncertain things of this uncertain climate. Often successive autumns pass which afford scarcely a day that may justly claim the designation. November, its special season, is often anything but golden. A few, bright, sunny days beam out along its course, and cheat us with an expectation that is doomed to disappointment. * * * Here [Detroit] too, and in the region of the lakes, its visits have become somewhat like those of the angels, though it has not deserted this, its favorite abode, altogether, as is the case in the Puritan's land. But so many years pass with so little semblance of it, that many even here are apt to look upon its existence as fabulous.

"Yet the Indian summer is no myth. It often breaks upon us from the very midst of storm, frost and snow, true to the tradition, that there must first be a 'squaw winter'[100] before we can have an 'Indian summer.' At once the icy blasts are locked securely in their northern caves, the snow melts and the earth dries under a genial sunshine. The calm, still atmosphere is filled with a smoky haze, which hangs like a veil over the landscape. Day after day succeeds of most

[97] The Seasons, in Pages from an Old Volume of Life, 1891, pp. 165, 166.
[98] Life and Letters, 1900, ii, 73, 74.
[99] An October Day, in Upland and Meadow, p. 386. Two years later Dr. Abbott wrote: "When or why the term 'Indian' was applied to the occasional brief spell of pleasant weather in November, I cannot determine. It is not a happily chosen one, certainly. * * * As I understand it, the true 'summer' week must occur in November, and a very marked hazy condition of the atmosphere is an absolutely essential feature." (The American, 1888, vi, 88, 89.)
[100] This is the only example of this term known to me in print. Miss Mickle writes from Toronto that formerly she wondered whether it was not a newspaper manufactured term, but her brother "who has spent many summers in the north and north-west of Canada" tells her that "the term is used by the guides and Indians in those regions." Miss Ellen D. Larned of Thompson, Conn., writes me that she was once told that a New Jersey lady (of New England parentage) reported the term "as handed down in her family. The Indians gave this name to the cold weather that precedes the genuine Indian Summer. After a light fall of snow that stood on the ground some hours," this lady "remarked, 'Now we have had our *squaw winter*,—there is snow enough on the ground to mark a rabbit's track,' and a few days after they had the spell of Indian summer, confirming the prophecy."

delicious, dreamy softness; not enervating like the heats of summer, but exhilarating to soul and body. For the rains and the frost have purified the atmosphere, rendering it elastic and bracing. The sun's rays have lost their power to oppress, and bring only enjoyment. How softly his beams fall on all surrounding objects,—the gold without the glitter. What a delicious atmosphere; we can almost fly in it!"[101]

Prof. R. Owen has recently said: "Although we have the high authority of Lieutenant Maury for the statement that this phenomenon sometimes occurs in the New England States, and even extends as far as Labrador, yet in its most persistent and characteristic form, namely that of haziness, rather than fog, and disappearance whenever the sun comes out with its meridian force, the Indian Summer seems more peculiarly a continental climatic condition not often found on seaboards, which partake rather of the so-called insular climate."[102]

In 1891 S. Perley wrote: "A season peculiar to New England is that known as the Indian summer, which occurs in October and continues only two or three weeks. It comes after the early frosts, when the wind is southwest, and the air is delightfully mild and sweet. The sky is then singularly transparent, pure and beautiful, and the fleecy clouds are bright with color."[103]

In 1898 the Australian novelist, writing under the name of R. Boldrewood, observed: "Cool nights, bracing mornings, and mild Indian-summer-like days."[104]

On the birthday of Queen Victoria in 1899, Alfred Austin addressed her in a poem called An Indian Summer, from which the following stanza is taken:

> "Long may the Indian Summer of your days
> Yet linger in the Land you love so well!
> And long may we who no less love You dwell
> In the reposeful radiance of your gaze,
> A golden sunset seen through Autumn's silvery haze."[105]

From the evidence which has thus far been presented, it is seen that the term Indian summer first made its appearance in the last decade of the eighteenth century; that during the next decade the expression "second summer" was used, indicating that there was no generally accepted designation for the supposed spell of peculiar weather in autumn; that this spell itself was first noted shortly before 1800; that the term Indian summer became established about twenty years after its earliest appearance; that it was first employed in western Pennsylvania; that it had spread to New England by 1798, to New York by 1809, to Canada by 1821, and to England by 1830; that the term is not merely an Americanism, but has become part of the English language in its widest sense, having actually supplanted in England expressions which had there been in vogue for centuries, and is now heard among English speaking people throughout the world; that it has been adopted by the poets; that it has often been employed in a beautiful figurative sense, as applied to the declining years of a man's life; and that it has given rise to much picturesque if also to some flamboyant writing. In short, to write in praise of the Indian summer is now a literary convention on three continents. So varied a history in little more than a century is certainly remarkable.

If, as we have seen, the term Indian summer is popularly used in an indefinite way, no less vague and uncertain are most of the explanations which have been advanced to account for its origin. The earliest suggestion appears to be due to Charles Brockden Brown, the first American novelist, who, in his translation of the passage cited above from Volney, added in a note: "Its American name it probably owes to its being predicted by the natives to the first emigrants, who took the early frosts as the signal of winter."[106]

It has already been sufficiently insisted on that there is no evidence to show that any one, native or foreigner, had any knowledge of the Indian-summer season until late in the eighteenth century; much less is there reason for supposing that the season was "predicted by the natives to the first emigrants." Nor is it apparent why the colonists should *not* have taken "the early frosts as the signal of winter," for had they not done so they would have been singularly lacking in their powers of observation.

In 1812 the Rev. James Freeman, whose revision of the Anglican liturgy in 1785 is held to have marked the beginning of the Unitarian movement in New England,[107] brought forward another explanation. He said:

"The southwest is the pleasantest wind, which blows in New England. In the month of October, in particular, after the frosts, which commonly take place at the end of September, it frequently produces two or three weeks of fair weather, in which the air is perfectly transparent, and the clouds, which float in a sky of the purest azure, are adorned with brilliant colours.

"This charming season is called the Indian Summer, a name which is derived from the natives, who believe that it is caused by a wind, which comes immediately from the court of their great and benevolent God Cautantowwit, or the southwestern God, the God, who is superiour to all other beings, who sends them every blessing which they enjoy, and to whom the souls of their fathers go after their decease."[108]

This view has often since been repeated and is sometimes referred to as the "New England tradition"[109] with respect to the origin of the name. If we turn to Roger Williams's Key into the Language of America, first published in 1643, we shall find the following passages:

"Lastly, it is famous that the *Sowwest (Sowaniu)* is the great Subject of their discourse. From thence their *Traditions.* There they say (at the *South-west*) is the Court of their *great God Cautántouwit:* At the *South-west* are their *Forefathers* soules; *to the South-west* they goe themselves when they dye; From the *South-west* came their *Corne,* and Beanes out of their Great *God Cautántouwits* field: and indeed the further *Northward* and *Westward* from us their Corne will not grow, but to the *Southward* better and better. * * * Pitch Sowwánishen. *It will be Southwest.*

"*Obs.* This is the pleasingest, warmest wind in the Climate, most desired of the *Indians,* making faire weather ordinarily; and therefore they have a *Tradition,* that to the Southwest, which they call *Sowwaníu,* the gods chiefly dwell; and hither the soules of all their Great and Good men and women goe."[110]

It is certain that Freeman had these passages in mind, and it is equally certain that Freeman's remark about the Indian

[101] Memorials of a Half Century, pp. 557–559. My attention was called to this passage by Professor Abbe.

[102] American Meteorological Journal, 1889–1890, vi, 392. Another communication on the subject will be found in the same volume, pp. 530, 531. I am indebted for these references to Mr. A. Lawrence Rotch of the Blue Hill Observatory.

[103] Historic Storms of New England, p. viii.

[104] Romance of Canvass Town, p. 71. Cited in the Oxford Dictionary.

[105] Victoria The Wise, 1901, p. 41. Cited in the Oxford Dictionary, where also is quoted an extract from J. C. Morison, Service of Man, 1889, p. 128. The late J. Payn in some novel said that "Mrs. Jennynge [was] in an Indian summer (delightful state) of rapture." (In J. M. Dixon's Dictionary of Idiomatic English Phrases, 1891, p. 171.)

[106] View of the Soil and Climate of the United States, 1804, p. 210.

[107] B. Wendell, Literary History of America, pp. 121, 122, 281.

[108] Sermons on Particular Occasions, Note to Sermon viii, pp. 277, 278.

[109] So called by a writer in 1833 (American Journal of Science, xxvii, 140). Thus within twenty-one years this view had, in the popular mind, grown into a "tradition."

[110] Key, 1866, pp. 84, 85, 171. In another place Williams says that scarcely one Indian in a hundred will kill a crow, because "they have a tradition, that the Crow brought them at first an *Indian* Graine of Corne in one Eare, and an *Indian* or *French* Beane in another, from the Great God *Kautántouwits* field in the Southwest from whence they hold came all their Corne and Beanes." (P. 174). I am indebted to Mr. W. W. Tooker of Sag Harbor, N. Y., for calling my attention as long ago as 1898 to the passages from Williams's book bearing on Freeman's view.

summer is an interpolation of his own, as there is no trace of it in Williams, who does not even so much as mention the autumn. Upon examination, then, this so-called "New England tradition" turns out to be, properly speaking, not a tradition at all, but merely a misapprehension on the part of Freeman of what Williams had said nearly a century and three quarters earlier. Hence this explanation of the origin of the name, being founded on a mistake, can not be accepted as adequate.

It often happens that a notion which is advanced by its originator as a suggestion merely, is soon spoken of as a certainty, and in course of time comes to be regarded as an established fact. We have now to consider an admirable illustration of this familiar process. In recent years it has again and again been asserted that the Indian summer derived its name from the burning of the woods and the grass by the Indians. The earliest allusion to such an idea known to me is in the following passage, written by Dr. D. Drake in 1815:

"The cause of this smokiness is supposed to be the conflagration, by the Indians, of withered grass and herbs on the extensive prairies to the north-west, and hence perhaps the name of the season." [111]

The most striking feature of this remark is its cautiousness. Drake says that the cause of the smokiness is *supposed* to be the burning of the prairies, and hence *perhaps* the origin of the name of the season. The question of the burning of the woods is worthy of some attention. Writing of New England in 1634, W. Wood said:

"The Climate in Winter is commonly cold and dry, the Snow lies long, which is thought to be no small nourishing to the ground. For the *Indians* burning it to suppresse the underwood, which else would grow all over the Countrey, the Snow falling not long after, keepes the ground warme, and with his melting conveighs the ashes into the pores of the earth, which doth fatten it. * * * It being the custome of the *Indians* to burne the wood in *November*, when the grasse is withered, and leaves dryed, it consumes all the underwood, and rubbish." [112]

In a Description of the New Netherlands, written in Dutch in 1656, Adriaen Van der Donck remarked; "In short the autumns in the New-Netherlands are as fine as the summers of Holland, and continue very long. * * * The wild geese, turkeys and deer are at their best in this season, and easiest obtained, because of the cold, and because the woods are now burnt over, and the brushwood and herbage out of the way. This is also the Indian hunting season, wherein such great numbers of deer are killed, that a person who is uninformed of the vast extent of the country, would imagine that all these animals would be destroyed in a short time.' [113]

Writing of Virginia in 1724, the Rev. H. Jones observed: "As to the Weather, the Spring and Fall are not unlike those Seasons in *England*, only the Air is never long foggy, nor very cloudy; but clear, sometimes of a bluish Colour, occasioned by the thin Smoak, dispersed in the Air, from the Flames of Woods and Leaves, which are fired in Hunting, to drive the Beasts from their lurking Places; or in the Spring to burn the old Leaves and Grass, that there may be the better Pasture the next Summer." [114]

In 1782 Jefferson, alluding to certain "bodies of warm air" often met with in Virginia, said: "They do not happen in the winter when the farmers kindle large fires in clearing up their grounds. They are not confined to the spring season, when we have fires which traverse whole countries, consuming the leaves which have fallen from the trees." [115]

Writing from St. Genevieve, La., February 10, 1808, C. Schultz, Jr., said: "In the fall of the year, when the grass and woods are generally dry, the country on both sides of the river [Mississippi] is almost continually on fire in some place or other. This principally proceeds from a custom the Indians have of clearing the woods for hunting; which it effectually accomplishes by consuming all the grass, weeds, and under wood, with which they are obstructed." [116]

There is abundant evidence that the Indians burned the woods and underbrush in the autumn, but they also did so in the spring—just as Americans do at present, and smoke caused by forest fires is by no means peculiar to the autumn; hence, while the Indian-summer season may have derived its name from this practice, there is no proof that such was the case.

In 1824 we meet with what is certainly the most curious explation of the origin of the name which has ever been advanced. In that year the Rev. Joseph Doddridge wrote:

"THE INDIAN SUMMER.

"As connected with the history of the Indian wars of the western country; it may not be amiss to give an explanation of the term 'Indian Summer.'

"This expression, like many others, has continued in general use; notwithstanding its original import has been forgotten. A backwoodsman, seldom hears this expression, without feeling a chill of horror, because it brings to his mind the painful recollection of its original application. Such is the force of the faculty of association in human nature.

"The reader must here be reminded, that, during the long continued Indian wars, sustained by the first settlers of the western country, they enjoyed no peace excepting in the winter season, when, owing to the severity of the weather, the Indians were unable to make their excursions into the settlements. The onset of winter was therefore hailed as a jubilee, by the early inhabitants of the country, who throughout the spring, and the early part of the fall, had been cooped up in their little uncomfortable forts, and subjected to all distresses of the Indian war.

"At the approach of winter, therefore all the farmers, excepting the owner of the fort, removed to their cabins on their farms, with the joyful feelings of a tenant of a prison, on recovering his release from confinement. All was bustle, and hilarity, in preparing for winter, by gathering in the corn, digging potatoes, fattening hogs, and repairing the cabins. To our forefathers, the gloomy months of winter were more pleasant than the zephers of spring, and the flowers of May.

"It however, sometimes happened, that after the apparent onset of winter, the weather became warm; the smokey time commenced, and lasted for a considerable number of days.

[111] Natural and Statistical View, or Picture of Cincinnati and the Miami Country, p. 110. This remark raises two points: First, as to the origin of the name; secondly, as to the cause of the alleged smokiness. The second point is beyond the scope of this paper, but a single comment is permissible. In 1858 Joseph Henry wrote:

"Though the first announcement of the proposition by some of our earlier meteorologists that the peculiar condition of the atmosphere known as 'Indian summer' might be produced by the burning of the prairies, was not thought deserving of any comment, yet the advance of science in revealing the facts just stated renders this hypothesis by no means unworthy of attention." (Scientific Writings, ii, 257.)

The proposition spoken of by Professor Henry does not appear to have originated with the meteorologists, and he was certainly wide of the mark in saying that it "was not thought deserving of any comment." The proposition received frequent comment, and those interested in it can easily satisfy their curiosity by looking up the numerous references given in this paper.

[112] New Englands Prospect, 1865, pp. 8, 17.

[113] Collections of the New York Historical Society, Second Series, 1841, i, 183. My attention was called to this passage by Mr. Tooker.

[114] Present State of Virginia, pp. 49, 50.

[115] Writings (Ford), iii, 181. In Maine, and doubtless in other parts of the country, there are frequently days in July and August which not only appear smoky, but on which the smoke is patent to the dullest olfactory nerves. The smoke is due to forest fires. I mention this obvious fact because some writers seem to think that a smoky (or apparently smoky) appearance of the atmosphere is confined to the autumn months.

[116] Travels, 1810, ii, 69.

This was the Indian summer, because it afforded the Indians another opportunity of visiting the settlements with their destructive warfare. The melting of the snow saddened every countenance, and the general warmth of the sun chilled every heart with horror. The apprehension of another visit from the Indians, and of being driven back to the detested fort, was painful in the highest degree, and the distressing apprehension was frequently realized." [117]

This theory stands wholly by itself, is unsupported by corroborating evidence, and its value is not easily determined. Doddridge actually lived in the region which he describes, and it would seem as if he ought to speak with authority. On the other hand, during the period to which he alludes—the years from 1763 to 1783—the very term itself is not known to have been in existence, Doddridge wrote from the recollection of more than forty years, and his book was published long after the Indians had ceased to be a serious factor in Virginia and Pennsylvania. His statement that the early settlers "enjoyed no peace excepting in the winter season" needs qualification. There can be no doubt that during the months of January and February the Indians were generally quiet, but this was not always the case, and some of the most famous of the Indian raids were made in the dead of winter—such, for instance, as that upon Lancaster, Mass., which occurred February 10, 1676. But it was not until late in December [118] that the settlers could hope for a respite, and it can easily be proved that Indian raids frequently took place in September, October, November, and early December, [119] besides, as already stated, occurring occasionally in January and February. Nothing is more rash than dogmatically to reject an account merely by reason of its seeming improbability, but the only safe attitude at present to take toward Doddridge's theory is one of scepticism.

The next suggestion was put forward in 1833 by some unknown Baltimorean, who said: "Probably the appellation of Indian, is derived from the circumstance of this period of the year, being selected by the aborigines of the country as their hunting season, to which it is highly conducive, not only on account of the plenty and perfection of the game, but also in consequence of the haziness or obscurity of the air, which favors a near, and unsuspected approach, to the object of pursuit." [120]

Two years later, Dr. Lyman Foot thus commented on the above passage: "Now, so far as our knowledge extends, and we have been pretty well acquainted with the western and north western Indians for the last thirteen years, it is the season of all others in which Indians hunt the least. * * *

"All who are acquainted with the western and north western Indians, know, that during the month of April or May, according to the latitude in which they reside, they collect together at what they call their villages, or towns. * * *

"Here they plant their corn, and a few other vegetables, the squaws performing all the labor, while the men spend most of their time in fishing. They rarely hunt, during the summer months, till ducks and geese begin to abound and to be in good condition, which is from the latter part of August to the first of November, during which time they kill great numbers of them in the waters contiguous to their villages.

"Thus they live from about May to November, collected together by hundreds—sometimes even hundreds of families.

"After gathering their corn and wild rice, if in a rice country, drying their fish, and packing in small sacks provisions for a long march; they prepare for what they call their winter's hunt. That is, they entirely desert their villages, and disperse in small bands to every part of the country, diving into the darkest forests, and ascending the various streams to the remotest parts of their territory, where they pass the winter in hunting and trapping animals, whose skins are valuable, and the flesh of which serves them for food." [121]

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[117] Notes, on the Settlement and Indian Wars, of the Western Parts of Virginia and Pennsylvania, from the Year 1763 until the Year 1783, inclusive, pp. 265, 266. This account was reprinted in S. Kercheval's History of the Valley of Virginia, 1833, pp. 253–410; in the New England Historical and Genealogical Register, 1849, iii, 26; in the Sixty-Second Annual Report of the Regents of the University of the State of New York, 1849, pp. 385, 386; and has often been referred to. De Vere, in his Americanisms, 1872, pp. 27, 28, attributes the account to Kercheval; but this is an error, as Kercheval is quoting Doddridge.

[118] Writing from Sunbury December 30, 1780, M. Smith said that an Indian attack had been made near Wyoming on the 6th of that month, and that another attack was intended, but added: "We are lately in hopes they will not be able to make their Intended Stroke, as the River & Creeks are now pretty high & Driveing thick with ice, but we fear they may hover on our Fronteer Dureing the Winter and Give us an early Stroke in the Spring." (Pennsylvania Archives, viii, 691.)

Writing from the same place February 28, 1782, Col. S. Hunter said: "As the Spring is now Approaching and the deep snow going off the Ground, * * * I have the Oppertunity of conversing with a number of the Inhabitants, which Realy declares to me that they intend to move of from the Frontiers (or at least to put their familys all out of the way of danger,) as they Expect the Cruel Hostill Visits from their unmercifull Enimys Early in the Spring that they have Experienced this three years past." (Ibid. ix, 503, 504.)

Writing from Portland, Me., December 7, 1746, the Rev. T. Smith said: "Sunday. Thin meeting, and growing more and more so. Public worship is like to drop; for in the summer people fear to come, because of the Indians, and in the winter they cannot come." (Journal, 1849, p. 126.)

[119] The following extracts are all purposely drawn from the Pennsylvania Archives, because the documents there printed relate to the section of the country written about by Doddridge, and the letters quoted were all written between 1763 and 1783, the period covered by Doddridge.

"On the 13 Inst. we have had, in a place in this County called the Great Cove, five persons Kill'd & Six missing." (Col. J. Armstrong, November 21, 1763, iv, 138.)

"In short there is very few Days there is not some murder committed on some part of our fruntears." (Lt. A. Lochry, November 4, 1777, iv, 741.)

"An Indian War is now raging around us in its utmost fury." (T. Smith and G. Woods, November 27, 1777, vi, 39.)

"The Indians * * * have still Continued to Destroy and Burn Houses, Barns and Grain." (Lt. A. Lochry, December 6, 1777, vi, 68.)

"I * * * beg leave to acquaint you what confusion these Frontiers is in at present, in regard of the Indians Commiting Hostilitys; there has been two men kill'd & scalped by them leatly, * * * but our People pursued them (as there had fell a snow which enabled our men to track), and killed two of the Indians." (Col. S. Hunter, January 14, 1778, vi, 175, 176.)

"The enemy within these ten days have come down in force and invested Wyoming." (Col. T. Hartley, November 9, 1778, vii, 81.)

"I am Just informed that Capt. Clark, * * * was attacked by Simon Girty & a party of Mingoes." (Gen. L. McIntosh, January 29, 1779, vii, 173.)

"On the 21st of last month a little girl was killed and another of about seventeen years of age taken prisoner by a party of Indians." (Col. D. Brodhead, October 9, 1779, xii, 164.)

"The Last Nineth Day of Sept. the Enemie Indians Did Attacked one of our Militia post." (Lt. Col. H. Geiger, September 12, 1781, ix, 396.)

See also Pennsylvania Archives, ix, 657; xi, 206, 209; xii, 179, 180, 189, 271; and Pennsylvania Colonial Records, ix, 43, 44; xi, 342, 347, 382, 403; xiii, 169, 417.

[120] American Journal of Science, xxvii, 140.

[121] American Journal of Science, 1836, xxx, 8, 9. Dr. Foot also said: "We have taken considerable pains to ascertain from the Chippeways, Menominies, Winnebagoes and others, whether they know, or notice, what we call Indian summer, and if so, what they call it. * * * If you ask an Indian in the fall when he is going to his hunting ground, he will tell you, when our fall summer comes, or when the Great Spirit sends us our fall summer—meaning the time in November which we call Indian summer. And they actually believe that the Great Spirit sends this mild season in November, after the cold fall rains, for their special benefit."

There is some discrepancy in Dr. Foot's remarks. He has just asserted that the autumn "is the season of all others in which Indians hunt the least;" and if such is the case, why should the Indians be going to their hunting grounds in November?

Dr. Foot's article has undergone strange perversions. In 1895 Frank N. Jones wrote: "Those who, in the early years of the settlement of the country by the whites, were at all conversant with the western and northwestern Indians, are said to have known that during the month of April or May, according to the latitude in which they dwelt, they were accustomed to collect together at what they called their villages or towns." (The Bostonian, iii, 170–174.)

The notion that any of the early settlers were "at all conversant" with the western and northwestern Indians, is amusing; and statements

That the Indians did hunt in the autumn, is certain; but then they hunted at other seasons as well,[122] and there is no evidence to connect Indian summer with the hunting of the Indians.

We have next to consider two suggestions which, in their vagueness, recall the one made by Brown in 1804.

In 1842 Z. Thompson wrote: "It has been said, though we do not vouch for its truth, that it was a maxim with the aborigines of this country, which had been handed down from time immemorial, that there would be 30 smoky days both in the spring and autumn of each year; and their reliance upon the occurrence of that number in autumn was such that they had no fears of winter setting in till the number was completed. This phenomenon occurred between the middle of October and the middle of December, but principally in November; and it being usually attended by an almost perfect calm, and a high temperature during the day, our ancestors, perhaps in allusion to the above maxim, gave it the name of *Indian Summer.*" [123]

In the same year J. F. Watson remarked: "The aged have given it as their tradition, that the Indians, long aware of such an annual return of pleasant days, were accustomed to say 'they always had a second summer of nine days just before the winter set in.' From this cause, it was said, the white inhabitants, in early times, called it the 'Indian summer.'" [124]

As with Drake in 1815, so with Thompson and Watson in 1842, the striking feature is the caution with which these suggestions are made. So too is it with another suggestion of Watson's in the same work: "It was the favourite time, it was said, of the Indian harvest, when they looked to gather their corn." [125]

This is one of the most plausible theories which have been advanced, it has met with a wide acceptance, and the fact that the term "Indian harvest" [126] was once in vogue certainly does not detract from its plausibility. If, however, we examine into the history of this term, we find that it was once current from 1642 to 1737, but in New England only; that by it was meant not the harvest gathered by the Indians, but merely the harvest of Indian corn or maize, that grain being so called to distinguish it from English corn or wheat, and that the term became obsolete more than half a century before the expression Indian summer is known to have come into existence. There is, therefore, absolutely no historical connection between the two terms. Finally, though of course the time for harvesting the maize varied in different parts of the country, it nowhere appears to have been later than about the end of October; yet the Indian-summer season, indefinite as we have seen it to be, is generally placed in the month of November.[127]

Our next theory brings us back to Indian mythology. In 1839 H. R. Schoolcraft wrote: "Mudjekewis and nine brothers conquered the Mammoth Bear, and obtained the Sacred Belt of Wampum, the great object of previous warlike enterprise, and the great means of happiness to men. The chief honour of this achievement was awarded to Mudjekewis, the youngest of the ten, who received the government of the West Winds. He is therefore called Kabeyun, the father of the winds. To his son, Wabun, he gave the East; to Shawondasee, the South, and to Kabibonokka, the North. Manabozho, being an illegitimate son, was left unprovided. When he grew up, and obtained the secret of his birth, he went to war against his father, Kabeyun, and having brought the latter to terms, he received the government of the Northwest Winds, ruling jointly with his brother Kabibonokka the tempests from that quarter of the heavens.

"Shawondasee is represented as an affluent, plethoric old man, who has grown unwieldy from repletion, and seldom moves. He keeps his eyes steadfastly fixed on the north. When he sighs, in autumn, we have those balmy southern airs, which communicate warmth and delight over the northern hemisphere, and make the *Indian Summer.*" [128]

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like those of Mr. Jones, which are more or less frequently made by the commentators, are of course derived from Dr. Foot's article, with the addition of attributing to the early settlers what was written in 1835.

[122] In 1744 A. Dobbs, writing of the Home Indians, said:—"The *Indians* West of the Bay, living an erratick Life, can have no Benefit by tame Fowl or Cattle; they seldom stay above a Fortnight in a Place, unless they find Plenty of Game. When they remove, after having built their Hut, they disperse to get Game for their Food, and meet again at Night, after having killed enough to maintain them for that Day; they don't go above a League or two from their Hut. When they find Scarcity of Game, they remove a League or two farther, and thus they traverse through these woody Countries and Bogs, scarce missing one Day, Winter or Summer, fair or foul, in the greatest Storms of Snow, but what they are employed in some kind of Chace." (Account of the Countries adjoining to Hudson's Bay, p. 41.)

Referring to the origin of the Indian war of 1774, R. Butler wrote on August 23 of that year: "2dly. They were preparing for a great Summer Hunt, which I can't Interpret into any hostile Intent by them." (Pennsylvania Archives, iv, 569.)

Writing from Fort Pitt, July 3, 1786, Col. J. Harmar said: "One John Bull (called by the Indians Sheebo) informs me that he left Detroit on the 29th of April, in company with one hundred Moravian Indians, men, women, and children, who are at present about four miles from Cuyahoga. That they have crossed the lake with the intention to settle near their old towns on the Muskingum, where a party of these Indians were formerly massacred; but as they are too late in the season for planting, their design is to remain and hunt near Cuyahoga until fall." (St. Clair Papers, 1882, ii, 13.)

[123] History of Vermont, i. 16,

[124] Annals of Philadelphia, ii, 362.

[125] Ibid., ii, 362.

[126] For a full discussion of this term and the evidence on which the opinion expressed in the text is based, see a note in The Nation of March 8, 1900, lxx, 183, 184.

[127] Very recently Dr. Edward Eggleston has expressed a different view, writing: "The season for reaping the familiar English grains was called by the emigrants the English harvest, the later ingathering of maize was the Indian harvest. From this distinction, perhaps, came the name Indian summer for the season of balmy weather that befalls in the autumn when a halcyon stillness pervades the hazy air and the whole landscape lies enchanted. The name was probably of merely agricultural origin, but is nowadays full of poetic associations with the delicious season and a vanished people." (Transit of Civilization from England to America in the Seventeenth Century, 1901, pp. 103, 104.)

Mrs. Wallace writes from Albany that her father was very well acquainted with Brant, who said that the Indian summer was the "Indian's summer" because at that time they gather the corn, the nuts, etc., that ripen in the first frost and are gathered in the following warm spell of weather. In addition to what has been said in the text, it may be pointed out that grain is harvested and nuts are gathered when they are ripe, regardless of the degree of temperature. Brant died in 1807, and in such letters written by him as I have seen (in his Life by W. L. Stone and elsewhere) there is no allusion to the subject.

[128] Algic Researches, ii, 214, 215. So far as I am aware, this passage (which was reprinted by Schoolcraft in 1856 in The Myth of Hiawatha, p. 88) has never before been quoted or referred to in connection with Indian summer. In 1861 the Rev. Peter Jones, whose Indian name was Kahkewaquonaby, gave this definition: "*Shahwundais*, m.; the god of the south, who makes the summer" (History of the Ojebway Indians, p. 162); but Jones did not speak of the Indian summer in connection with Shahwundais. On the other hand, Schoolcraft did not allude to the Indian summer when relating the stories of Manabozho.

Under date of October 20, 1854, Longfellow wrote in his journal: "The Indian summer is beginning early. A charming tradition in the mythology of the Indians, that this soft, hazy weather is made by the passionate sighs of Shawondessa, the South." (Life, 1891, ii, 277.)

In the following year Longfellow elaborated this notion in Hiawatha (Poetical Works, 1886, ii, 128, 129), as follows:

"Shawondasee, fat and lazy,
Had his dwelling far to southward,
In the drowsy, dreamy sunshine,
In the never-ending Summer.
He it was who sent the wood-birds,
Sent the robin, the Opechee,
Sent the blue-bird, the Owaissa,
Sent the Shawshaw, sent the swallow,
Sent the wild-goose, Wawa, northward,
Sent the melons and tobacco,
And the grapes in purple clusters.

Schoolcraft's first wife was a half breed Ojibway or Chippeway woman,[129] and it would seem as if he ought to have been familiar with the legends and traditions of that tribe. But I can find no earlier allusion to the legend than its mention by Schoolcraft in 1839, at which time the term Indian summer had been known among the whites for forty-five years, and had for nearly thirty years enjoyed a great popular vogue. It is difficult to avoid the conclusion that in the passage from Schoolcraft we have an account dressed up by the white narrator; and if such is the case, not much reliance can be placed upon it.[130] At all events, it is certainly unwarrantable to assume that an alleged Indian legend, unheard of until 1839, explains the origin of a term which had already been in existence among the whites for nearly half a century.

In 1861 we get from the Rev. Peter Jones, himself an Indian, another explanation of the origin of the name. He wrote: "This Nanahbozhoo now sits at the North Pole, overlooking all the transactions and affairs of the people he has placed on the earth. The Northern tribes say that Nanahbozhoo always sleeps during the winter; but, previous to his falling asleep, fills his great pipe, and smokes for several days, and that it is the smoke arising from the mouth and pipe of Nanahbozhoo which produces what is called 'Indian summer.'"[131]

"From his pipe the smoke ascending,
Filled the sky with haze and vapor,
Filled the air with dreamy softness,
Gave a twinkle to the water,
Touched the rugged hills with smoothness,
Brought the tender Indian Summer
To the melancholy north-land,
In the dreamy Moon of Snow-shoes."

According to Brinton, Nanibozhu is "the same deity that reappears under the names *Manabozho*, *Michabo*, and *Messou*, among the Chipeway tribes."[132] Nanibozhu rejoices in a great variety of names, the meanings of which are not known with certainty. That the story was exceedingly popular is evident from the many allusions to it during three centuries[133], but unfortunately we obtain no version of it by an Indian until well into the nineteenth century. Prof. A. F. Chamberlain, who has made a special study of the legend, pertinently remarks: "It is matter of regret that the Nanibozhu tales have not all come down to us or been recorded in the language of the Indian narrator himself. Had we the *ipsissima verba* in the various Algonkian dialects, it is reasonable to suppose that much that is archaic and ancient in speech would be forthcoming. We cannot be certain that folk-etymology has not been at work. * * * No doubt each narrator tells the story in his own way, omits some points that seem to him of little value or interest, and by and by inserts into the legend incidents which do not occur in its archaic form. Then he may deem it necessary to give a local coloring to the tale, and may be willing even to point out the exact spots where the events narrated took place. It is only by possessing accurate accounts of these myths from different sources and in different dialects, that we shall be able to determine with reasonable accuracy what the oldest form of each particular legend actually was. Unfortunately most of them have been recorded in English or

[129] She was the daughter of Mr. Johnson, an Irishman, and of his wife, Oshauguscodaywaygua, herself the daughter of Wabajick, a Chippeway or Ojibway chief. In his Sketches of a Tour to the Lakes, pp. 181–190, T. L. McKenney gives some details about Mr. Johnson and his family.

[130] Scholars now look askance at Schoolcraft. Dr. Frank Russell of Harvard University writes me that "we do not consider Schoolcraft reliable as a final authority." Mr. Lucien Carr of Cambridge writes me that Schoolcraft "is not always trustworthy." Prof. A. F. Chamberlain of Clark University writes me that "while I would hardly say that Schoolcraft made up the myth, he was quite equal to so doing." In 1867 Parkman, refering to Schoolcraft's extensive work on the Indian Tribes, said: "It is a singularly crude and illiterate production, stuffed with blunders and contradictions, giving evidence on every page of a striking unfitness either for historical or philosophical inquiry, and taxing to the utmost the patience of those who would extract what is valuable in it from its oceans of pedantic verbiage." (Jesuits in North America, p. lxxx.)

In 1868 Dr. Brinton wrote of the same work: "Mr. Schoolcraft was a man of deficient education and narrow prejudices, pompous in style, and inaccurate in statement. The information from original observers it contains is often of real value, but the general views on aboriginal history and religion are shallow and untrustworthy in the extreme." (Myths of the New World, p. 40.)

In 1883 Horatio Hale, writing of the Onondaga chief Hiawatha, said: "This legend, or, rather, congeries of intermingled legends, was communicated by Clark to Schoolcraft, when the latter was compiling his 'Notes on the Iroquois.' Mr. Schoolcraft, pleased with the poetical cast of the story, and the euphonious name, made confusion worse confounded by transferring the hero to a distant region and identifying him with Manabozho, a fantastic deity of the Ojibways. Schoolcraft's volume, which he chose to entitle 'The Hiawatha Legends,' has not in it a single fact or fiction relating to Hiawatha himself or to the Iroquois deity Taronhiawagon. Wild Ojibway stories concerning Manabozho and his comrades form the staple of its contents. But it is to this collection that we owe the charming poem of Longfellow; and thus, by an extraordinary fortune, a grave Iroquois lawgiver of the fifteenth century has become, in modern literature, an Ojibway demigod, son of the West Wind, and companion of the tricksy Paupukkeewis, the boastful Iagoo, and the strong Kwasind. If a Chinese traveler, during the middle ages, inquiring into the history and religion of the western nations, had confounded King Alfred with King Arthur, and both with Odin, he would not have made a more preposterous confusion of names and characters than that which has hitherto disguised the genuine personality of the great Onondaga reformer." (The Iroquois Book of Rites, p. 36.)

Evidently we can not accept a legend merely on the authority of Schoolcraft. A slight inaccuracy in Hale's statement, however, may be pointed out. Schoolcraft's The Myth of Hiawatha (or The Hiawatha Legends) was published in 1856, a year after the appearance of Longfellow's Hiawatha; hence, it is not "to this collection that we owe the charming poem of Longfellow." As already stated, it was from Schoolcraft's Algic Researches that Longfellow obtained his view of the Indian summer.

[131] History of the Ojebway Indians, p. 35. In 1868 Dr. Brinton wrote: "From the remotest wilds of the northwest to the coast of the Atlantic, from the southern boundaries of Carolina to the cheerless swamps of Hudson's Bay, the Algonkins were never tired of gathering around the winter fire and repeating the story of Manibozho or Michabo, the Great Hare. * * * In many of the tales which the whites have preserved of Michabo he seems half a wizzard, half a simpleton. * * * What he really was we must seek in the accounts of older travellers, in the invocations of the jossakeeds or prophets, and in the part assigned to him in the solemn mysteries of religion. * * * In the autumn, in 'the moon of the falling leaf,' ere he composes himself to his winter's sleep, he fills his great pipe and takes a godlike smoke. The balmy clouds float over the hills and woodlands, filling the air with the haze of the 'Indian summer.'" (Myths of the New World, pp. 161–163.)

The "moon of the falling leaf" is, according to Jones, October. (History, p. 136.) It is clear that Brinton drew his account of the Indian summer from Jones, to whom indeed he refers in a note.

Miss Mickle of Toronto sends me the following modern version: "When the summer is past and all the fruits are gathered, for everything has grown and ripened and is dying, then the great Manitou knows that his work for the year is over, and being weary he goes to Manitoulin Island to rest and smoke his pipe in peace before the winter comes. And as he lies there smoking, the fire in his pipe warms the earth, and the smoke of it spreads over the nations and covers every lake and hill. It is believed that Manitoulin Island was so named from this legend, but of that I am not sure."

For references to Manitoulin Island, see the Jesuit Relations and Allied Documents, lv, 132, 321; N. Perrot, Mémoire sur les Mœurs, Coustumes et Religion des Sauvages de l'Amérique Septentrionale, 1864, pp. 126, 290; A. Henry, Travels, 1809, p. 36; T. L. McKenney, Sketches of a Tour to the Lakes, 1827, p. 164. There is no allusion by these writers to the smoking Manitou of Miss Mickle's version.

Mrs. Mary C. Judd writes from Jefferson, Wis., that she knows of only one term given by the Indians to Indian summer,—namely, Menabozho's summer, which is the name among the Chippeways. She adds that a number of tribes, such as the Mandans and some others located in Dakota, have no name for the season, as it means little to them.

[132] Essays of an Americanist, 1890, p. 131.

[133] See the Jesuit Relations and Allied Documents, v, 154–156, 285, vi, 156–158, l, 288, liv, 156, 200; Charlevoix, Histoire et Description Générale de la Nouvelle France, 1744, v, 416, vi, 64; Perrot, Mémoire, &c., pp. 3–8, 12, 19, 160, 176; W. Strachey, Historie of Travaile into Virginia Britannica, 1869, pp. 98, 99; Schoolcraft, Algic Researches, i, 134–174, History, Condition and Prospects of the Indian Tribes, v, 418–420; A. Henry, Travels, 1809, pp. 212, 213; T. L. McKenney, Sketches of a Tour to the Lakes, 1827, pp. 302–305; J. Tanner, Narrative, 1830, pp. 192–194, 322, 351–368; D. G. Brinton, Myths of the New World, 1868, pp. 160–169; W. J. Hoffman, American Anthropologist, ii, 215–223, iii, 243–258; A. F. Chamberlain, Journal of American Folk-Lore, iv, 193–213, v. 291.

French only, and not in the native tongue of the Indian narrator."[134]

The earliest allusion which I have been able to find in these stories to the smoking of Nanibozhu is in a passage written May 21, 1852, by the Rev. Peter Jacobs (Pahtahsega), who said: "We encamped for the evening near the mountains and point called by the Indians, Nanahboshoo. * * * There is a large stone here, near the Nanahboshoo mountains, which is very remarkable. The stone looks as if some man had sat on the rock and made an impression on it, as one would on the snow in winter. This was not carved by any Indian, but it is very natural. The impression is very large, and is about six times as large as an impression made in the snow by a man. The Indians say that Nanahboshoo, a god, sat here long ago, and smoked, and that he left it for the west. Every time the Indians pass here, they leave tobacco at the stone, that Nanahboshoo might smoke in his kingdom in the west. The Indians tell many traditions respecting Nanahboshoo, and of his wonderful deeds."[135]

There is here no trace of Indian summer, and the allusion to this season, in connection with the tales of Nanibozhu, appears to be due to Jones. In other words, we do not meet with the Indian summer in this legend until sixty-seven years after the first appearance of the term among the whites. There is no evidence known to me to show that such a season was recognized by the Indians, or that if it was recognized by them it had a particular name, and in no book relating to the Indians have I found the slightest allusion to the Indian summer until 1839.[136]

In 1889 the editors of the Century Dictionary observed: "The name is due to the fact that the phenomena of the Indian summer are much more distinctly marked in the region chiefly occupied by the Indians at the time this term became current than they are in the more eastern regions, to which the white population was chiefly limited prior to the beginning of the present century."

As we are not informed either when or where the term first became current, this passage offers no definite point for discussion. We are, however, told that the Indian summer is "a period in autumn characterized by calm and absence of rain," and that "this condition is especially well manifested in the upper Mississippi valley." If from this we are to infer that, in the opinion of the editors, the term first became current in the valley of the Mississippi, the opinion must be pronounced erroneous; for, as we have seen, the term was employed in Pennsylvania, New York, and New England before it reached the Mississippi valley.

More recently another suggestion has been offered. The Indians were deceitful, and the uncertainty as to the Indian character became a by-word, and hence, by a poetical transition, the short seasons of pleasant weather in November may have been known as "Indian summers" because the pleasant weather could not be relied upon and was sure to be followed by some sudden and severe cold northerly winds and snow.[137] This suggestion is interesting, but the present writer does not know of any evidence by which it can be supported.

There are perhaps no words or phrases which are so difficult to trace to their origin as those which are, or may be, or are supposed to be connected with the Indians. Few Indians before 1800 could write, of the few who could still fewer did, and of the few who did none appear to have written about their own people.[138] Consequently our knowledge of the languages, religions, myths, legends, traditions, and manners and customs of the Indians come to us through the whites; and among peoples which have no literature of their own it is notoriously difficult to arrive at true accounts in regard to such matters. There is certainly no lack of variety in the theories which have been discussed, but however it may appear to others, it does not seem to me that any one of them has any substantial basis in fact. It is possible that the name will some day be traced to an Indian myth or legend; but we can not at present say with certainty that the allusions to the Indian summer in those tales related by Schoolcraft and by Jones are genuine, and the evidence points to the conclusion that these allusions have found their way to the Indians from the whites.[139] We shall, therefore, be obliged to suspend judgment with respect to the origin of the name of the Indian-summer season until fresh evidence as to the early history of the term is produced.[140]

[134] Journal of American Folk-Lore, 1891, iv, 194, 195, 196.

[135] Journal, Boston, second edition, 1853, p. 16. This passage is referred to but not quoted in Professor Chamberlain's article. The places mentioned by Jacobs are on the border of Lake Superior. In 1809 A. Henry wrote: "From Mamance to Nanibojou is fifteen leagues. Nanibojou is on the eastern side of the Bay of Michipicoten. At the opposite point, or cape, are several small islands, under one of which, according to Indian tradition, is buried Nanibojou, a person of the most sacred memory. Nanibojou is otherwise called by the names of Minabojou, Michabou, Messou, Shactac, and a variety of others, but of all of which the interpretation appears to be, *The Great Hare*. The traditions, related of the Great Hare, are as varied as his name. * * * I have heard many other stories concerning Nanibojou, and many have been already given to the public; and this at least is certain, that sacrifices are offered, on the island which is called his grave or tumulus, by all who pass it. I landed there, and found on the projecting rocks a quantity of tobacco, rotting in the rain; together with kettles, broken guns, and a variety of other articles. His spirit is supposed to make this its constant residence; and here to preside over the lake, and over the Indians, in their navigation and fishing." (Travels, pp. 212, 213.)

It will be observed that Henry speaks of Nanibozhu as buried under an island in Lake Superior, that Jacobs makes the hero god leave Lake Superior for his kingdom in the West, and that Jones represents him as sitting at the North Pole. Professor Chamberlain writes me that "the smoking Nanibozhu may be authentic," but adds that he is unable to give any further information in regard to the legend.

[136] I desire to emphasize this fact, which is certainly remarkable. In the Nanibozhu tales we are introduced to a difficult and intricate problem, and one that can be adequately treated only by those who have a special knowledge of Indian mythology. It is possible that a minute study of these tales will lead to some more definite conclusion than, with the evidence at present in my possession, I feel able to reach; and these tales are commended to specialists as a subject for inquiry.

[137] This suggestion has occurred to Professor Abbe, whose words I use, and also to others. Miss Mickle calls my attention to a passage written by Martha Bockée Flint in 1900: "In our early history, in the days of lurking ambush and midnight onslaught, 'Indian' was the synonym of deceit, and the mellow sweetness of these fall days * * * was not to be trusted." (Garden of Simples, p. 137.)

[138] The Rev. Samson Occom printed a sermon in 1772, and the famous Joseph Brant made several translations from English into Indian and contemplated writing a history of the Six Nations, but unfortunately this intention was never fulfilled. (See his Life by Stone, 1838, ii, 288.) It is not until well into the nineteenth century that we get books about Indians by Indians.

[139] A curious illustration of this process is contained in the letter sent by Mrs. Judd. Referring to the Chippeways, she writes that Menabozho "is their Manitou of every day life and happenings, and the Chippewa children call Santa Claus by this name."

[140] Dr. Murray writes me: "It would be interesting if the real history of the American Indian Summer could be made out, but the history of such phrases is often irrecoverable—not from any want of diligence, but because no diligence can discover that of which no record was made at the time. There is no more possibility of discovering the origin of every word and phrase, than there is of discovering the history of every old house, the name of its builder, the workmen employed, etc."

Some odds and ends may be brought together in this note. In 1872 some unknown person said: "All this accords with the theory to which allusion has been made as that of a member of the club to whom Mr. Flagg dedicates his book, and which * * * may be here stated to import that in late October, when the early colonists thought the winter had fairly set in, the Indians said, 'No, no; there will be summer yet.' And when the mild days came, Carver and Standish and others said, remembering, 'Lo! the Indian summer!'" (Harper's Magazine, xlvi, 297, 298.)

In 1880 Moncure D. Conway wrote: "And what is a Martin summer? It is what, dear reader, you would call an Indian summer. As that was said by the aboriginal American to be the smile of the Great Spirit, this was said by the original Christian of Touraine to be the smile of St. Martin." (Ibid. lxi, 383.)

Some reader may wish to look up the following references: American Journal of Science, x, 204, xviii, 66, 67, Second Series, i, 168, 189; L. F.

That the term Indian summer was introduced into England from this country is made certain from the evidence presented in this paper; but, singularly enough, before the American expression found its way across the Atlantic, and even before the American expression made its appearance in the United States, there occurred in an English writer an example of the term Indian summer itself. Writing from London July 12, 1778, Horace Walpole said: "Has not this Indian summer dispersed your complaints?"

Is it possible that this is an anticipation of our American expression? Did Walpole have in mind the North American Indians, the West Indies, or India? Some further passages from his letters throw light on these questions. On August 22, 1778, he again wrote: "I hope this Elysian summer, for it has been above Indian, has dispersed all your complaints. Yet it does not agree with fruit; the peaches and nectarines are shrivelled to the size of damsons, and half of them drop. Yet, you remember what portly bellies the peaches had at Paris, where it is generally as hot."

On September 5, 1779, Walpole remarked: "Lady Blandford * * * told me when I expostulated with her, that the machine was worn out, and that life was of no value when uncomfortable. She has persisted perfectly cool and in her senses, begging for laudanum, suffering dreadfully, and the more, as you may imagine, from our late more than West Indian heats."

Finally, on August 16, 1780, Walpole observed: "My own little landscape is brown and parched. A sultry east wind has reigned for eight-and-twenty days, and left us neither grass nor leaves. This is the third summer that our climate has been growing as Asiatic as our Government; and the Macphersons and Dalrymples, I suppose, will hail the epoch of the introduction of camels and dromedaries in lieu of flocks of sheep; yet a Russian fleet riding in the Downs is a little drawback on our Ottoman dignity."[141]

It will be observed that these letters were written in the months of July, August, and September. Clearly, therefore, Walpole could not have had in mind, even if he knew about it, our supposed autumnal spell of peculiar weather, for though that has been stated to occur in every month from September to January, yet no one as yet has been rash enough to place it in July or August. Taking into consideration the high temperature of those three summers, the allusion both to the West Indies and to India, it seems tolerably certain that those two parts of the world were connected in Walpole's mind with intense heat, and that his "Indian summer" was merely a chance phrase giving expression to this association of ideas.[142]

Kaemtz, Complete Course of Meteorology, 1845, p. 283; Proceedings of the American Association for the Advancement of Science, xi, 203; Rear Admiral R. Fitz Roy, The Weather Book, 1863, pp. 76, 166, 167; Harper's Magazine, 1864, xxx, 124, 125; American Cyclopædia, 1876, xv, 466; K. C. Kwong, Dictionary of English Phrases, 1881, p. 527; Signal Service Notes, No. IX, Weather Proverbs, 1883, pp. 89, 104; The Bizarre, iii, 30; American Notes and Queries, ii, 268, 269, v, 185, 226, viii, 32, 33; R. Inwards, Weather Lore, 1893, p. 8; B. W. Green, Word-Book of Virginia Folk-Speech, 1899, p. 199.

[141] Letters, 1891, vii, 94, 112, 246, 425. I am again indebted to Mr. E. P. Merritt for calling my attention to these passages.

[142] What seems to be precisely the same idea is found in a letter written from New Jersey by an Englishwoman. Under date of April, 1820, Frances Wright D'Arusmont remarked: "The close of the winter, for one may not term it the spring, is here decidedly the least agreeable season of the year. Siberian winds to-day and Indian heats to-morrow, and then driving sleet the next day, and so on, from heat to cold and cold to heat, until the last finally prevails, and all nature bursts into sudden life as by the spell of a magician." (Views of Society and Manners in America, 1821, p. 451.)

Last spring Professor Abbe suggested that "some early traveler who had been in India and had experienced the dry, hazy weather of the dusty Indian plains recognized nearly the same kind of sky in our Indian summer haze." Of the British officers who served in America during the Revolutionary war, some, like Cornwallis, afterwards had distinguished careers in India, but probably few had been in India before their American campaigns. As for travelers, the only one I can recall in this country before 1800 who had previously been in India was Thomas Twining. He sailed from India in 1795, landed in Philadelphia in April, 1796, visited Baltimore, Washington, and New York, and sailed for England in June. While here he kept a journal, which has recently been published, but it contains no allusions to climate. (Travels in India a Hundred Years Ago, with a Visit to the United States, London, 1893, pp. 347–448; and Travels in America 100 Years Ago, New York, 1894.)

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

Science. London. Vol. 15.

Clayton, H. Helm. The Daily Barometric Wave. P. 232.

Scientific American Supplement. New York. Vol. 53.

Myers, Carl E Aerial Navigation Problems. P. 21859–60.

—— London Fogs. P. 21880.

Maunder, (Mrs.) Walter. The Polar Rays of the Corona. P. 21887.

Bell, Arthur H. The flight of a Hailstone. P. 21903–4.

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Claudy, C. H. Wind Velocity and Direction. No. 13. Pp. 1–3.

—— The Kite in Meteorology. No. 14. Pp. 1–3.

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Nature. London. Vol. 65.

Shaw, W. N. Experiments on Ventilating Cowls. Pp. 344–345.

Halm, J. A New Solar Theory. Pp. 351–354.

MacDowall, Alex. B. The Moon and Thunderstorms. P. 367.

—— Scientific Work of the German Antarctic Expedition. Pp. 378–379.

Ayrton, Hertha. Note on Electric Charging and Discharging at a Distance. P. 390.

Ram, Gilbert S. The Origin of the Scale of Fahrenheit's Thermometer. P. 391.

Crookes, William. Radio-Activity and the Electron Theory. Pp. 400–402.

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Sutherland, William. Ionization, Ionic Velocities, and Atomic Sizes. P. 161–177.

Kirkby, P. J. On the Electrical Conductivities produced in Air by the Motion of Negative Ions. P. 212–225.

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Rotch, A. Lawrence. The Exploration of the Atmosphere at Sea by means of Kites. Pp. 1–8.

Milne, J. Meteorological Phenomena in relation to Changes in the Vertical. Pp. 9–18.

Russell, F. A. R. Further Observations and Conclusions in relation to Atmospheric Transparency. Pp. 19–27.

Hoseason, W. S. Remarkable Phosphorescent Principle observed in the Persian Gulf, April 4 and 9, 1901. Pp. 29–33.

Edwin, R. A. On the Mechanical Principle of Atmospheric Circulation. P. 33.

—— Damage by Lightning at Higher Brookland, Devon, June 30, 1901. Pp. 27–28.

—— Registration of Bright Sunshine at the Royal Alfred Observatory, Mauritius. P. 39.

—— Barograph Trace during Typhoon, August 2–3, 1901. Pp. 39–40.

—— Wind Force in Tornadoes. Pp. 40–41.

—— Observations of the Edinburg Rock Thermometers. P. 41.

Comptes Rendus de l'Academie des Sciences. Paris. Tome 134.

Teisserenc de Bort, L[éon]. Étude des variations journalières des éléments météorologiques dans l'atmosphère. Pp. 253–256.

Nordmann, Charles. Recherche des ondes hertziennes émanées du soleil. Pp. 273–275.

Landerer, J. J. Sur l'observation galvanométrique des orages lointains. Pp. 279–281.

Sebillant, —. Sur une chute de pluie observée à Périers. [Note.] Pp. 324–325.

Branly, Edouard. Radioconducteurs à contact unique. Pp. 347–349.

Meslin, Georges. Sur une forme de thermomètre électrique. Pp. 412–414.

Gonnessiat, F. Un second semestre d'observations météorologiques à Quito. Pp. 425–427.

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Brückner, Ed. L'origine de la pluie. Pp. 565–570.

—— Les migrations d'oiseaux et le temps. Pp. 580–582.

Polis, P. Contribution à la climatologie des Hautes-Fagnes et de l'Eifel. Pp. 583–596.

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Rostaing Lisboa, Carlos de. Description du ballon dirigeable "Aéronave Brazil." Pp. 14–23.

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Kalähne, Alfred. Ueber die Benutzung stehender Capillarwellen auf Flüssigkeiten als Beugungsgitter und die Oberflächenspannung von Wasser und Quecksilber. Pp. 440–476.

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—— Preis-Ausschreiben. Pp. 26–27.

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Hergesell, H. Vorläufiger Bericht über die internationale Ballonfahrt am 5 September 1901. P. 34.

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Hergesell, H. Vorläufiger Bericht über die internationale Ballonfahrt am 7 November 1901. Pp. 34–35.

Sieberg, Aug. Ein Beispiel für die Wirbelbewegungen in Cumulus-wolken. Pp. 35–37.

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Suschnig, G. Bericht über den III internationalen Wetterschiess-Kongress in Lyon. Pp. 39–40.

Mache, H. Beiträge zur Kenntniss der atmospärischen Elektricitäts-Beobachtungen in Indien und Oberägypten. Pp. 40–41.

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Jansson. —. Sur la conductibilité calorifique de la neige. Pp. 121–122.

STUDIES ON THE STATICS AND KINEMATICS OF THE ATMOSPHERE IN THE UNITED STATES.

By Prof. FRANK H. BIGELOW.

II. METHOD OF OBSERVING AND DISCUSSING THE MOTIONS OF THE ATMOSPHERE.

INTRODUCTORY REMARKS.

It has been suggested to me that it would be advantageous to many who are interested in the progress of modern meteorology, if the results of the observations on clouds, which were made by the United States Weather Bureau during the years 1896–97, could be put in a more compact form than was adopted in the original report.[1]

I am the more inclined to present anew some of my results because of the extensive use that has been made of the American observations generally in Dr. J. Hann's Lehrbuch der Meteorologie, 1901. In this judicious and comprehensive summary of the state of meteorology at the end of the nineteenth century, Dr. Hann has given very generous recognition to the contributions of the United States, including the Weather Bureau and the Blue Hill Observatory, to the advancement of meteorology. But more important than this, the views therein adopted regarding the theories of the circulation of the atmosphere in the general and the local cyclones, are fully in accord with the ideas set forth in my report on the cloud observations of 1896–97. It is apparent that meteorology is at last securing a set of principles founded on observations, which will supersede much that has been heretofore taught in this connection. It is therefore important to explain the results of the Weather Bureau observations of 1896–97 as briefly and simply as possible.

Taking a very general view of the present state of meteorology, it may be proper to classify the conditions as follows: The statistical side of the subject is being rapidly worked up, so that our knowledge of facts is relatively quite complete in climatology, and in the diurnal and annual periods of the various atmospheric elements, namely, pressure, temperature, vapor tension, and wind direction, in different parts of the world, so far as they prevail in the strata near the ground. But in the upper strata our knowledge of these elements is still very limited, though it has been considerably extended during the past ten years, by the cloud observations, and the balloon and kite ascensions. On the theoretical side of static meteorology it may be said that meteorological analysis is well advanced, as far as concerns the barometric relations of pressure to the height, the temperature and vapor tension variations, and the adiabatic thermodynamics generally. The practical extension and application of these formulæ to the upper strata is making fair progress, and is likely to result in very definite knowledge of the true state of the atmosphere throughout its extent. In dynamic meteorology, however, that is in the hydrodynamics of the atmosphere, affairs are in an unsatisfactory condition, and they can be reclaimed only by pursuing a sound policy regarding them. Looking over the entire field, one is surprised to find that but little has been done in the preliminary and the most necessary stages of this work, in order to make the dynamics of the atmosphere a practical scientific problem. It is wasting time to speculate on the mathematical analysis of the motions of the atmosphere till we know what the motions are, simply as a case of kinematics. In other words, the paths of motion of the average air currents should be systematically worked up all over the world, as the indispensable preliminary to this study. Of course the obstacle in the way of doing this is the invisibility of the air itself, and the labor of making any observations on its direction and velocity of motion much above the ground. It was for supplying just this need that the international cloud observations of 1896–97 were instituted, and to it they have contributed a valuable amount of data.

Furthermore, there are the great physical problems connected with the absorption of the sun's radiant energy in the atmosphere, its separation into several kinds of energy—electric and magnetic energy, heat energy of the visible and invisible spectrum, and so on. Also there is the question to be answered as to the amount of the solar output itself, the variations from its mean value, how much and what kinds of energy are absorbed in the upper strata, and what in the lower. The circulation of the atmosphere in its details really goes back to these questions about which we know only a very little. Hence,

[1] Report on the International Cloud Observations, May 1 1896, to July 1, 1897, by Prof. Frank H. Bigelow. Report of the Chief of the Weather Bureau, 1898–99, Vol. II.

in a word, the deficiency of modern meteorology is in the dynamics of the upper and middle strata of the atmosphere.

NOTATION AND COORDINATES.

It is not an exceptional fact in the history of science that in the first stages of its development meteorology should have grown up in a rather haphazard fashion, especially as it was dealing with a subject of popular interest, wherein many observers were concerned in getting observations of one kind or another without much regard to their ultimate use in mathematical analysis. As the result of this lack of purpose the confusion became so great between the methods of observing and recording in different parts of the world that when comparative studies were begun the difficulties arising from the want of homogeneity were seriously felt. In order to remedy this state of confusion the International Meteorological Committee have been laboring for years to introduce uniformity into the methods adopted by meteorologists. Much has already been accomplished, and yet there are at least two very important steps that remain to be taken. The first is to use only one system of measures, as the metric in place of the metric and the English; and the second is to conduct and discuss the observations in such a way that in their published form they shall be in perfect order to meet the requirements of the fundamental mathematical equations, either static or dynamic, as they are needed. At present meteorological observations are about evenly divided between the English and the metric systems of measures, since the former is in use in Great Britain, Canada, United States, south Africa, Australia, and India; while the latter prevails in Europe, Asia generally, Japan, north Africa, and South America. Thus it is necessary to translate the figures from one system to the other in preparing the data for the world and for cosmical problems; also two sets of reduction tables are required for all the elements, and two sets of constants in all the formulæ. The more lamentable defect occurs from the fact that the observations are made without relation to their final use in mathematical discussions involving the motions of the atmosphere. Indeed almost nothing has been done to give us the true vector components of motion in the observations, so that they shall be in form for immediate introduction into the equations. The standard equations have been presented by different authors in many equivalent forms, and in consequence the subject has been made unnecessarily complex and difficult for students. The entire body of fundamental equations in meteorology is not very large, but the amount appears to be much greater than it really is by reason of the manifold notations and symbols which have been employed. No more valuable reform could be instituted than that of causing the same physical quantity to be always represented by the same symbol. Thus, for example, barometric pressure B, pressure in units of force P, pressure in units of weight p, would put us in harmony with the leading works in hydrodynamics and thermodynamics; then absolute temperature T, thermometric temperature t, mean temperature of the air column θ, vapor tension e, maximum vapor tension E, absolute weight of vapor μ, weight of the unit volume σ, specific weight ρ, and relative humidity $R.H.$ For rectangular coordinates, displacements (x, y, z) s, velocities (u, v, w) q, accelerations $(\dot{u}, \dot{v}, \dot{w})$ f, angular velocities $(\omega_1, \omega_2, \omega_3)$; for cylindrical coordinates, radius ϖ, angle about axis of rotation φ; for polar coordinates, radius vector r, polar distance θ, angle about axis of rotation λ.

I have felt the weight of these considerations in my comparative studies so much that special pains have been taken in my report to exhibit all the fundamental equations in a standard system of notation, and also to reduce the analyses of several authors to the same standard system for the sake of ready intercomparison. Also, as it seems to be of the utmost importance that the observations taken to determine the motions of the atmosphere should be made in a form appropriate for use in the dynamic equations without further transformation of the data, particular care was taken to make the cloud observations conform to these requirements. It was not possible to bring about this harmony between observations and the analytical theory without introducing some radical changes in the methods heretofore followed by meteorologists, both in the conduct of the observations and in the analytic development of the equations. Accordingly, some account of these changes, as well as of the new results which were deduced from the cloud observations made by the United States Weather Bureau in 1896–97, will be given in the following pages.

THE AXES OF COORDINATES.

The first decision that must be made in establishing a fundamental system of notation has regard to the choice of the axes of coordinates which shall be placed at the base of the entire study, since all the algebraic signs of the quantities depending on the observations which are to be substituted in the equations, must be determined from the adopted positive direction of the axes. This choice depends practically upon two facts, (1) that the radius of the earth is drawn positive outwards, since r increases from the center, and (2) that the right-hand rotation is adopted generally in modern scientific researches. It is true that some of the German mathematicians use the left-hand rotation, but the trend is toward a universal adoption of the right-hand system. If we take as the primary radius that of the earth's axis of rotation in the Northern Hemisphere, as is most appropriate for all scientific problems except in terrestial magnetism, then in polar coordinates the positive angular development in polar distance, θ, is southward; next, with the right-hand rotation about this axis extended upward, the positive development of λ, the angle in longitude, is eastward. Hence, for all systems of coordinates, polar, cylindrical, and rectangular, the azimuth rotation is *from the south through the east, north, and west.* Unfortunately this is in the opposite direction to the azimuth rotation adopted in astronomy, in navigation, and in popular meteorology, because in these branches of science the simple practical consideration has been to follow the sun in its diurnal course, so that azimuth circles and compass cards are numbered around in the clockwise or left-hand rotation. For many statistical purposes, as where average wind directions are to be computed, it makes little difference what system of notation is used, because these data do not look beyond their own immediate purposes. But where we have to deal with a system of equations it is not so. If we take the first set of equations, International Cloud Report (154), for linear velocities due to rotation,

$$u_1 = u - y\,\omega_3 + z\,\omega_2$$
$$v_1 = v - z\,\omega_1 + x\,\omega_3$$
$$w_1 = w - x\,\omega_2 + y\,\omega_1$$

where x, y, z are linear distances, u, v, w are linear velocities, ω_1, ω_2, ω_3 are angular velocities, it is evidently necessary that all these should be defined most carefully. According to the statement given above,

$+ (x, u)$ are referred to the southward axis,
$+ (y, v)$ are referred to the eastward axis,
$+ (z, w)$ are referred to the zenithward axis,

but everything will go wrong if ω_3 is not taken to rotate positively about the axis z, from the south through the east, instead of through the west. Hence, ω_1 turns the axis of y to z, ω_2 the axis of z to x, ω_3 the axis x to y, in cyclical order. Thus it happens that, having adopted this system of rotation, it was found necessary to transform the equations of some well-known mathematical papers in dynamic meteorology to agree with it.

THE AZIMUTH ROTATION.

There is one further difficulty to overcome in regard to the

popular meteorological system. An observer determines the direction of the wind by looking toward it and feeling the force of it on his face, or he sets up a wind vane with an arrow pointing in the direction *from which* it blows. This is, however, exactly contrary to the method that mathematical physicists employ, for they describe a stream line by the direction *toward which* it flows. An arrow is drawn on a map "down stream" to show how the current flows, or on the weather map an arrow is said to "fly with the wind." In the latter case meteorologists are inconsistent with themselves, but they adopt the correct principle in their precept on the map. If we describe a wind as having a velocity of so many miles per hour from a given direction, say the north, this must be changed in azimuth through 180° to the south in order to be of use in analytic work. We have thus to make *two reversals* in the common meteorological system: (1) the wind vector must be turned through 180°, and (2) the azimuth must be numbered from the south = 0° toward the east = 90°, north = 180°, and west =270°. These two changes render it impossible to use the ordinary wind records which are found in meteorological reports without making this transformation. While it is not a very important matter for a few individual cases, it becomes a serious task to do the work of remodeling the figures for a large amount of data. It was for the purpose of saving this labor that the observations of the Weather Bureau were executed in 1896–97 on the correct system, so that all the figures appearing in the final report should be at once ready for use in the equations of hydrodynamics.

In order to facilitate the understanding of the discussion that follows, a chart is introduced to show the scheme of the operations. Fig. 1 gives a comparison of the azimuth system

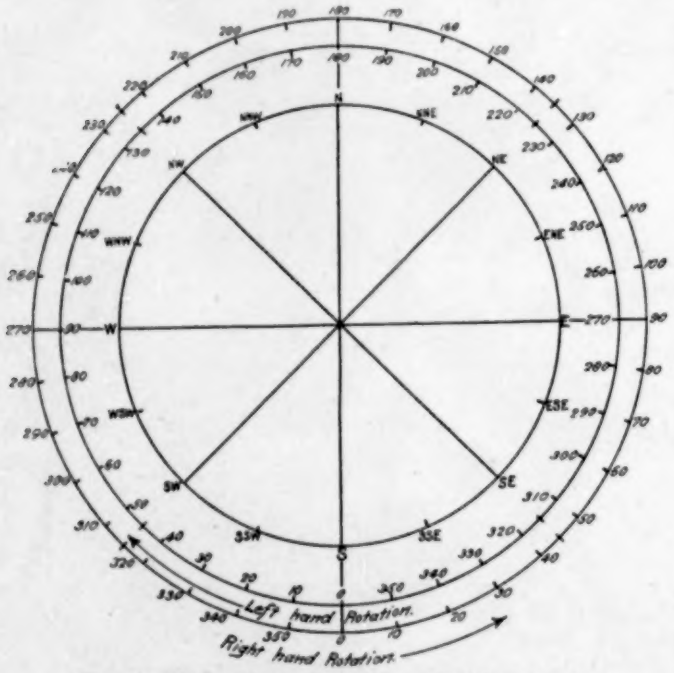

FIG. 1.—Comparison of the two azimuth systems.

Left-hand rotation gives azimuth of "motion from."
Right-hand rotation gives azimuth of "motion toward."
Positive translation is vertically upward.

commonly employed by meteorologists with the one adopted in this report. The former is the left-hand rotation, such as astronomers use, and is counted from the south through the west point of the horizon. In this system, also, the observer faces the wind and gives the azimuth of the direction *from which* it blows. This has been abandoned for the reasons already mentioned, and in place of it is substituted the right-hand rotation, wherein the azimuth is counted from the south through the east point. Here the observer receives the wind on his back and looks toward the direction in which the arrow flies and *toward which* the air is moving. Thus a wind *from the NW* by the former system, with azimuth angle 135°, becomes a wind *toward the SE*, with the azimuth angle 45°, by the latter system. The working out of the results by this system, ready for analytic discussion, as will be seen, involves a minimum of computation, and besides this it reduces all the velocity components to the fundamental rectangular system of coordinates adopted by Ferrel in his treatise, and continued in my "Standard System" which forms a part of the Report.

The Marvin nephoscopes, with which the observations were made, were all graduated to read in a right-hand (anticlockwise) azimuth; the theodolites were also read in the same direction, and the azimuths of Tables 6 and 9 of the International Cloud Report are, therefore, in accord with the coordinate directions of the formulæ which are developed in the following portions of the same Report.

THE COMPOSITION AND RESOLUTION OF THE VECTORS OF MOTION.

It is sometimes necessary to construct the resultant velocity and direction of the motion of the air at a given place out of a large number of individual observations, as in forming charts 20–35, International Cloud Report, for example, and the following practical devices were found convenient. Suppose it

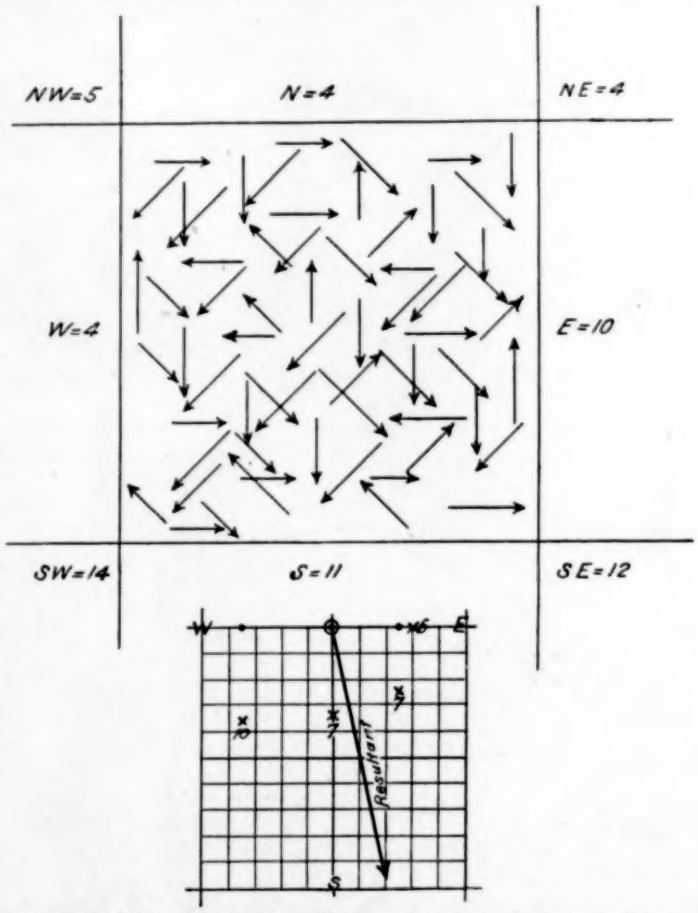

Fig. 2.—Example of the graphic composition of wind vectors.

is desired to determine the velocity and direction of motion in the cumulus cloud level on all sides of a low area, as in the Mississippi Valley. We can best proceed as follows: Take a piece of tracing paper, and select a large number of cloud maps showing about the same configuration of the isobars, so that the centers of the cyclones are located in a given district. Then lay the paper on the cloud maps in succession, and trace the arrows showing the cloud motion wherever an observation is found on the map. Mark the center on the first map and preserve it so as to place it in coincidence with the other cyclonic

centers. Continue to fill the paper till some such composite of arrows is obtained as is shown within the square of fig. 2. A scale map of squares, or any other adopted division of areas, is to be prepared as large as the tracing paper, and the two are placed together so that the scale diagram marks off the arrows of the composite map into groups, within each of which it is proposed to find the resultant. Then count out the number of arrows pointing N, NE, E, etc., in succession for eight directions, giving in our example, N=4, NE=4, E=10, etc.; take the excess in four directions, as S = 7, E = 6, SE = 7, SW = 10; plot these results on a diagram and resolve SE = 7 into E = 5 and S = 5; also SW = 10 into W = —7 and S = +7; make the sums E = +4 and S = +19; plot these components and obtain the resultant $V=20$; the angle $\varphi=9°$ can be found by the use of a circular protractor, or it can be computed by the formula $\tan \varphi = \frac{E}{S}$, having regard to a change of algebraic signs for W = —E and N = —S

Wind vector.	Component.	
	E	S
S=7	.....	+7
E=6	+6	.....
SE=7	+5	+5
SW=10	—7	+7
	+4	+19

$V = 20$; $\varphi = 9°$, that is, = S 9° E.

$$\tan \varphi = \frac{E}{S} = \frac{4}{19} = 0.21.$$

It is easy to perform a large amount of graphic composition in a short time after a little practise, by arranging this work systematically. In the collection of vectors from the maps the total number will differ from square to square, and it is necessary to reduce the resultant to a common standard number. Suppose we adopt 40 arrows as the standard, then the completed resultant velocity must be reduced in that proportion. Our example contained 64 arrows, hence $20 \times \frac{40}{64} = 12$, and 12 is to be adopted as the average velocity of the motion in the azimuth 9°, that is, S 9° E. These resultants assume that the average of a number of observed directions gives a *relative* velocity of motion, which can be reduced to an absolute velocity as soon as the true mean motion is determined from some other source, as by theodolite observations. Charts constructed in this way are quite correct as to the direction of the motion of the atmosphere, and they give the relative velocities in different parts of a cyclone or anticyclone with sufficient precision to permit further important studies.

By the nephoscope observations the actual velocities in different portions of the area surrounding the center of motion were computed and collected for the several subareas about the highs and lows, as explained in chapter 7 of the International Cloud Report. The relative velocities there recorded can be turned into actual velocities by utilizing the corresponding theodolite observations. The nephoscope refers all the observed motions to the 1000-meter plane, and the theodolite to the actual plane of motion at the height given by the angular measurements. I note that Dr. J. Hann, in his Lehrbuch der Meteorologie, pages 272, 273, and 275, attributes certain cloud heights of the Weather Bureau observations to the nephoscopes, but this is a mistake, because all our heights were determined by the theodolites. The heights associated with the nephoscope observations were adopted for translating the relative velocities of the nephoscopes into actual velocities, and his impression doubtless arose from printing such adopted heights in conjunction with the other data which were derived from nephoscopes.

THE RESOLUTION OF FORCES.

In the study of the motions of the atmosphere at all levels there are two types of resolution of vectors to be provided for in the discussion, the first in rectangular coordinates,

$+x$ = South, $+y$ = East, $+z$ = zenithward,
$-x$ = North, $-y$ = West, $-z$ = nadirward,

in order to apply them to the motions of the general circulation over the entire hemisphere; and the second in cylindrical coordinates,

$+x$ = radial outward,
$-x$ = radial inward,
$+y$ = tangential counter-clockwise,
$-y$ = tangential clockwise,
$+z$ = vertical upwards on the axis,
$-z$ = vertical downwards on the axis, the results being used in the analysis of cyclones and anticyclones, that is in the local circulations. It is evident that the vectors provided by the theodolite and nephoscope observations, in the form V = velocity and φ = azimuth counted from the south through the east, are ready for simple trigonometric resolution into the velocity coordinates (u_1, v_1) in the four quadrants by using the proper signs. When all the vectors (V, φ) are resolved in the north-south and west-east directions, we can take the mean values by summation and then compute the average motion of the entire mass of air circulating at a given altitude over any locality. It is necessary to obtain these mean directions of motion for the entire circulation, in order to be able to resolve out the special components of local circulation belonging to the cyclones and anticyclones. In the report on the International Cloud Observations the results of this rectangular resolution of the observed mean vectors are set forth in Table 33 as a summary; in Tables 34, 35, and 36 for high areas in the northern and southern portions of the United States; in Tables 38, 39, and 40 for the low areas in the northern and the southern portions of the United States; in Tables 42 and 43 the component southward and eastward velocities in highs and lows, also in selected areas; and in Tables 48, 49, 50, and 51 the seasonal velocities in the upper and lower cloud levels. This data bears directly upon the problem of the upper air currents in the general circulation, and similar data ought to be obtained in all portions of the world.

These rectangular, meridional, and longitudinal velocity components are marked u_1, v_1 in order to distinguish them from the cylindrical components which are designated u_2, v_2. Having constructed the individual components of general motion u_1, v_1 in all the subareas together with the corresponding normal velocities, it is evident that the algebraic differences between them gives the true cyclonic and anticyclonic components, still in rectangular coordinates, as in Tables 44 and 45. The next step is to transform them into cylindrical coordinates u_2, v_2 with the least possible labor. For this purpose it is important to select the subareas surrounding the center of a local circulation in such a manner as will contribute to that purpose. If the areas marked out by the 5° meridians and parallels of latitude are taken, it is impossible to transform the component velocities without a most tedious computation. Such areas are suitable for a simple display of the stream lines, but they do not readily lend themselves to the composition and resolution of vectors of motion.

I have, therefore, adopted the following plan for the subareas surrounding a center of motion. They each have about the same relative area, and they are distributed as far as possible on the cardinal lines of the compass direction. They are numbered with the right-hand rotation, and they are central each on some cardinal point of the compass. Thus on the north-south line 17, 9, 3, 1, 5, 13 are located; on the west-

east line 19, 11, 4, 2, 7, 15 are found; while 18, 10, 6, 14 run from NW to SE, and 20, 12, 8, 16 from SW to NE. Hence it is seen that all the N-S and W-E areas are immediately available for composition in rectangular and in cylindrical coordinates, while the rectangular coordinates of the NW-SE and SW-NE areas which come from the first collection need only a simple transformation to become the radial and tangential components of cyclonic circulation. These latter are to be ultimately worked out, and we shall then have three sets of coordinates arranged symmetrically about the center

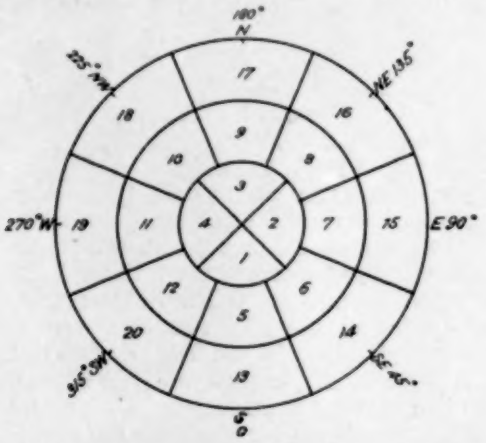

FIG. 3.—Plan of the subareas, azimuths, and compass points, adopted in high and low areas, for the discussion of cloud observations.

The mean of areas 1 to 4 = I, at the average distance 250 km.
The mean of areas 5 to 12 = II, at the average distance 750 km.
The mean of areas 13 to 20 = III, at the average distance 1,250 km.

of the three circles I, II, III at certain evenly distributed distances. The scale of the original diagram, Chart 9, International Cloud Report, is on a radius of 3 centimeters; on the weather maps this is equivalent to 15 centimeters, where 1 cetimeter is equal to 100 kilometers. The adopted scale is therefore *one-fifth* the scale of the daily weather map, and on it 1 centimeter represents 500 kilometers or 310.7 miles, and one millimeter is equivalent to 50 kilometers, or 31.1 miles. All the diagrams of the Report, as far as possible, are reproduced on this scale, but they are readily interpreted on the weather map, so far as linear dimensions are concerned.

VECTORS OF MOTION IN HIGH AND LOW AREAS—RECTANGULAR COORDINATES.

In order to prepare the observations for discussion all those which were made in the same subarea of a cyclone or an anticyclone were collected together in each cloud stratum, and the resultant of all these individual vectors was computed in accordance with the method above described. The individual observations occur in Table 9, and the mode of collecting them is illustrated in Table 29, page 363 of the Report. For convenience, the United States was divided into six districts: 1, Alberta; 2, Lakes; 3, New England; 4, Colorado; 5, West Gulf; 6, South Atlantic; so as to arrive at a conception of the prevailing local characteristics. Hence the heading of the form **H—2—15**, occurring in several tables, means that in subarea **15**, of a high area or anticyclone whose center is in the Lake district, the accompanying observations were made in the several cloud strata, and also at the surface where the instrumental meteorological data are given at the three daily observations. Table 32 contains the resulting vectors V, φ for the northern and southern groups by districts, also for the four seasonal quarters of the year, together with the several mean values, all this extending to the eight cloud strata. In this table the relative velocities are given as derived from the nephoscope, that is on the 1,000-meter plane.

The vectors of Table 32 are plotted on Chart 13 of the Report, the northern in red and the southern in blue, first for the high areas and then for the low areas; also in the seasonal groups so that the comparative motions can be studied. It is evident that several years work are needed to produce smooth and evenly balanced mean vectors, which shall truly represent the average circulation. Especially it will be necessary for the Canadian stations to cooperate and supply the vectors wanting in the northern subareas of our three northern districts, as this part of the circulation usually extends into Canada. Furthermore, the vectors of Table 32 are collected together numerically in Tables 34 to 40, with a single change, namely, that the velocities observed on the 1,000-meter plane have been multiplied by the adopted mean height of the given cloud stratum. For example, the mean height of the cirrus is taken as 9.8 kilometers, and hence the mean annual velocity $V = 3.6$ of the cirrus in high area No. 1., page 368, is multiplied by 9.8, and it is entered at the beginning of Table 34 as $V = 35.3$. I have taken the cirrus in each subarea of the high and low areas to show as an example in Table 1 and fig. 4.

TABLE 1.—*Direction and velocity of motion in high and low areas—rectangular coordinates.**

Compass Point.	Area number.	Cirrus; average height 9.8 kilometers.					
		High.			Low.		
		No.	φ	V	No.	φ	V
S	1	25	86	35.3	7	111	51.0
E	2	16	57	43.1	4	96	40.2
N	3	49	76	31.4	..	...	....
W	4	30	78	36.3	6	104	58.8
S	5	37	66	37.2	50	97	31.4
SE	6	20	67	32.3	33	101	44.1
E	7	23	90	58.8	10	109	36.3
NE	8	43	89	29.4	..	...	....
N	9	51	81	34.3	7	90	49.0
NW	10	34	117	38.2	3	92	27.4
W	11	42	80	37.2	23	77	45.1
SW	12	12	107	14.7	6	105	56.8
S	13	38	95	31.4	27	123	33.3
SE	14	64	82	35.3	70	93	32.3
E	15	28	100	46.1	49	85	34.3
NE	16	58	85	28.4	24	90	30.4
N	17	27	88	36.3	..	...	....
NW	18	25	96	33.3	2	122	39.2
W	19	51	98	29.4	36	71	44.1
SW	20	63	109	30.4	94	90	41.2
No. of obs....		736	...	....	451	...	....
Means		...	...	34.9	...	...	40.8

*Extracts from Tables 34 and 38.

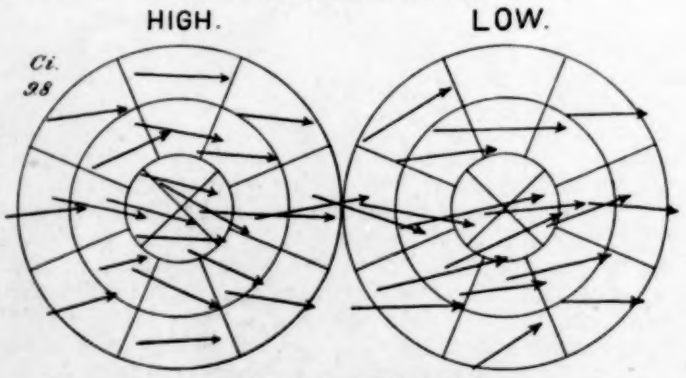

FIG. 4. (From Chart 15.)

These vectors are plotted on Chart 15 (see fig. 4), which

shows the annual vectors on the several cloud levels in high and low areas. From Chart 15 and the Tables 34–40 are obtained the data for discussing the mean general circulaton over the United States. The mean total velocities in high and low areas, without regard to direction, are found by taking the mean of the velocities in the areas of Tables (34–40) and they are given in Table 33, section 1, as in the following example, Table 2:

TABLE 2.—*Total velocities in highs and lows without regard to directions.**

Clouds.	High areas.				Low areas.		
	Height, kilom.	All groups.	North-ern.	South-ern.	All groups.	North-ern.	South-ern.
Ci	9.8	34.9	38.3	30.4	40.8	44.6	28.3
Ci. S	9.8	39.1	42.6	34.8	39.8	42.5	36.3
Ci. Cu	8.1	33.5	33.9	30.5	39.3	43.8	34.8
A. S	5.9	30.2	31.1	24.1	36.0	39.4	30.5
A. Cu	4.5	23.5	26.6	19.7	29.2	32.6	24.4
S. Cu	2.5	23.3	22.7	18.5	28.6	32.9	21.1
Cu	1.5	11.2	10.9	10.4	14.6	17.4	11.8
S	0.9	11.4	12.2	9.5	11.1	13.2	8.6
Wind	0	4.8	4.9	4.8	5.4	5.3	5.9
Range, per ct				19	15		28
From Table		34	35	36	38	39	40

*Extract from Table 33, Section I.

TABLE 3.—*General rectangular components of motion in high and low areas.**

Compass point.	Area number.	Cirrus, average height 9.8 kilometers.			
		High.		Low.	
		S+	E+	S+	E+
S	1	+ 2.5	+35.2	—18.3	+47.7
E	2	+23.5	+36.2	— 4.2	+40.0
N	3	+ 7.6	+30.5		
W	4	+ 8.6	+35.5	—14.2	+57.0
S	5	+15.1	+34.0	— 3.8	+31.2
SE	6	+12.6	+29.7	— 8.4	+43.3
E	7	0.0	+58.8	—11.8	+34.3
NE	8	+ 0.5	+29.4		
N	9	+ 5.4	+33.9	0.0	+49.0
NW	10	—17.3	+34.0	— 1.0	+27.4
W	11	+ 6.4	+36.6	+10.1	+43.9
SW	12	— 4.3	+14.1	—14.7	+54.9
S	13	— 2.7	+31.3	—18.1	+27.9
SE	14	+ 4.9	+34.9	— 1.6	+32.3
E	15	— 8.0	+45.4	+ 3.0	+34.2
NE	16	+ 2.5	+28.3	0.0	+30.4
N	17	+ 1.3	+36.3		
NW	18	— 5.2	+33.1	—20.8	+33.2
W	19	— 4.1	+29.1	+14.4	+41.7
SW	20	— 9.9	+28.8	0.0	+41.2
Means		+1.97	+33.7	—5.26	+39.4
Normals		— 1.6	+36.6	— 1.6	+36.6
Means		+0.66	+40.1	—3.75	+32.7

*Extract from Tables 42 and 43.

Table 2 shows that the velocities are greater in the northern circuit than in the southern, and greater in the low areas than in the high areas. These values must be studied in connection with the barometric gradients to form a theory of the dynamic action in the atmospheric circulation.

The vectors in the form velocity and azimuth, V, φ, are next resolved into rectangular components in the north-south, west-east direction by the trigonometric rules, and the results are given in Tables 42, 43, from which the example in Table 3 is taken.

The means of these components are taken out in two ways: (1) the algebraic mean which gives the rectangular coordinates of motion in the general circulation for the highs and the lows, respectively. The mean of these last forms the normals from which the true cyclonic components are computed, and they are printed in heavy faced type. These results are collected together in Table 33, Sections II and III, from which the following extract is made, Table 4:

TABLE 4.—*Southward and eastward components of velocities in highs and lows.**

Clouds.	High areas.		Low areas.		Means.	Means.
	+S −N	+E −W	+S −N	+E −W	North.	East.
Ci	+ 1.97	+33.7	— 5.26	+39.4	— 1.6	+36.6
Ci. S	+ 1.65	+32.0	— 9.24	+35.9	— 3.8	+34.0
Ci. Cu	— 0.60	+32.6	— 3.00	+37.2	— 1.8	+34.9
A. S	— 0.37	+27.2	— 4.60	+31.3	— 2.5	+29.2
A. Cu	— 0.07	+22.1	— 2.38	+24.3	— 1.2	+23.2
S. Cu	— 0.32	+16.0	— 4.00	+24.3	— 2.2	+20.2
Cu	— 0.13	+ 5.1	— 0.11	+11.4	— 0.1	+ 8.3
S	— 1.22	+ 5.8	— 1.32	+ 7.8	— 1.3	+ 6.8
Wind	— 0.69	+ 1.1	— 0.40	+ 1.5	— 0.5	+ 1.3
From Table	42	42	43	43		

*Extract from Table 33, Sections II and III.

TABLE 5.—*Component velocities in selected areas between high and low centers.**

Clouds.	Selected areas.			
	Southward. H. 16, 8, 2, 7, 15, 6, 14 L. 18, 10, 4, 11, 19, 12, 20		Northward. L. 16, 8, 2, 7, 15, 6, 14 H. 18, 10, 4, 11, 19, 12, 20	
Ci	+ 0.66	+40.1	— 3.75	+32.7
Ci. S	— 2.11	+36.9	— 3.89	+38.9
Ci. Cu	+ 4.95	+38.7	— 7.34	+32.1
A. S	+ 2.79	+26.5	— 7.47	+31.0
A. Cu	+ 6.24	+23.7	— 7.78	+21.9
S. Cu	+10.22	+22.1	—11.13	+17.1
Cu	+ 6.52	+ 9.6	— 8.13	+ 6.5
S	+ 5.25	+ 7.5	— 7.97	+ 5.1
Wind	+ 2.23	+ 3.2	— 3.25	+ 0.2
Range				
From Table	42	42	43	43

*Extract from Table 33, Section IV.

The most important remark to be made regarding these extracts is that the observations show an average northern component in the United States in all levels, provided it is a fact that as much air streams through the low areas as through the high areas on the average. (2) The subareas were collected into two groups, those having a southward and those having a northward component. Thus we have a southward component in high areas in 16, 8, 2, 7, 15, 6, 14, and in low areas in 18, 10, 4, 11, 19, 12, 20; but a northward component in high areas in 18, 10, 4, 11, 19, 12, 20, and in low areas in 16, 8, 2, 7, 15, 6, 14. The means from these groups give the mean

components of the distinctly southward and northward currents in the different strata. They are collected in Table 33, Section IV, and are reproduced in Table 5:

TABLE 6.—*Anticyclonic and cyclonic components, cirrus 9.8 kilom.**

HIGH AREAS.

Area No.	Rectangular components.				Cylindrical components.	
	u_1	v_1	σ	β	u_2	v_2
1	+ 4.1	— 1.4			+ 4.1	— 1.4
2	+25.1	— 0.4			— 0.4	—25.1
3	+ 9.2	— 6.1			— 9.2	+ 6.1
4	+10.2	— 1.1			+ 1.1	+10.2
5	+16.7	— 2.6			+16.7	— 2.6
6	+14.2	— 6.9	15.7	333	+ 4.9	—14.9
7	+ 1.6	+22.2			+22.2	— 1.6
8	+ 2.1	— 7.2	7.5	286	— 6.6	+ 3.6
9	+ 7.0	— 2.7			— 7.0	+ 2.7
10	—15.7	— 2.6	16.0	190	+13.2	— 9.2
11	+ 8.0	0.0			0.0	+ 8.0
12	— 2.7	—22.5	22.8	263	+14.0	—18.0
13	— 1.1	— 5.3			— 1.1	— 5.3
14	+ 6.5	— 1.7	6.8	345	+ 3.4	— 5.9
15	— 7.4	+ 8.8			+ 8.8	+ 7.4
16	+ 4.1	— 8.3	9.2	296	— 8.7	+ 3.0
17	+ 2.9	— 0.3			— 2.9	+ 0.3
18	— 3.6	— 3.5	5.0	225	+ 5.0	0.0
19	— 2.5	— 7.5			+ 7.5	— 2.5
20	— 8.3	— 7.8	11.4	223	0.0	—11.4

LOW AREAS.

Area No.	Rectangular components.				Cylindrical components.	
	u_1	v_1	σ	β	u_2	v_2
1	—16.7	+11.1			—16.7	+11.1
2	— 2.6	+ 3.4			+ 3.4	+ 2.6
3	.....	.....			.....	.....
4	—12.6	+20.4			—20.4	—12.6
5	— 2.6	— 5.4			— 2.2	— 5.4
6	— 6.8	+ 6.7	9.6	136	— 0.1	+ 9.6
7	—10.2	— 2.3			— 2.3	+10.2
8	.....	.....	....	...	.....	.....
9	+ 1.6	+12.4			— 1.6	—12.4
10	+ 0.6	— 9.2	9.3	274	+ 6.1	+ 7.0
11	+11.7	+ 7.3			— 7.3	+11.7
12	—13.1	+18.3	22.6	127	—22.5	+ 3.2
13	—16.5	— 8.7			—16.5	— 8.7
14	0.0	— 4.3	4.3	270	— 3.0	— 3.0
15	+ 4.6	— 2.4			— 2.4	— 4.6
16	+ 1.6	— 6.2	6.4	285	— 5.5	+ 3.2
17	.....	.....	....	...	.....	.....
18	—19.2	— 3.4	19.6	190	+16.1	—11.3
19	+16.0	+ 5.1			— 5.1	+16.0
20	+ 1.6	+ 4.6	5.0	70	— 2.2	+ 4.6

*Extracts from Tables 44, 46 and 45, 47.

It is important to note that the most rapid currents, both northward and southward in the atmosphere, are in the strato-cumulus level, 2.5 kilometers or 1.6 miles above the ground, and that these currents decrease in velocity above and below that level. The eastward velocity averages about the same in the highs and lows. Hence we infer that the strato-cumulus level is the stratum where the interchanging motion is most rapid between the Tropics and the poles.

VECTORS OF MOTION IN HIGH AND LOW AREAS—CYLINDRICAL COORDINATES.

We can now compute the true cyclonic and anticyclonic rectangular components by simply subtracting the normal values (heavy type, Table 3) from the individual subarea values in each cloud stratum. In this way the components u_1, v_1 of Tables 44, 45 are found, and an example is given above, in Table 6, in the cirrus level for the high and low areas. Against subareas 6, 8, 10, 12, 14, 16, 18, 20 there are placed the corresponding vectors (σ, β), velocity and azimuth, because these are needed in resolving the rectangular into cylindrical components. In the other subareas the components are already in the N–S and W–E directions and they can be transformed by mere inspection into the corresponding cylindrical coordinates, which are radial and tangential to a circle about the central axis, and they give u_2, v_2, as in Table 6, and fig. 5 following, in which $+ u_1 =$ southward, $+ v_1 =$ eastward, $+ u_2 =$ radial outward, $+ v_2 =$ tangential anticlockwise.

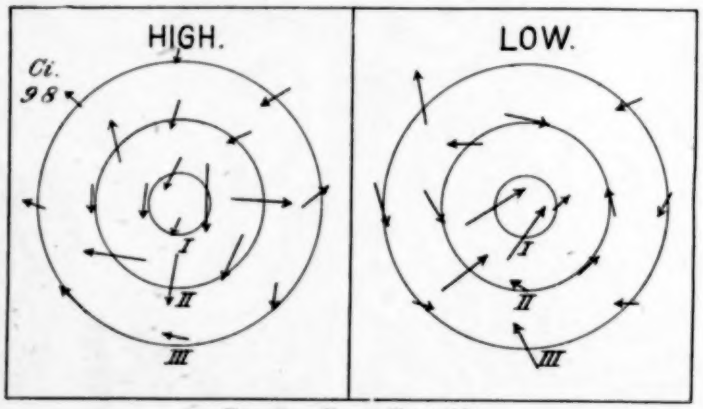

FIG. 5. (From Chart 16.)

Those which do not lie on the north-south west-east lines are transformed as follows: The coordinates u_1, v_1 are compounded into the vector (σ, β), σ being the linear distance from the center, and β the angle from the south. Thus in cirrus 6, high, Table 44, $u_1=14.2$, $v_1=-6.9$, and we find $\sigma=15.7$, $\beta=333°$, which can be verified by reference to Chart 16 *a*. In the same way all the vectors under subareas 6, 8, 10, 42, 14, 16, 13, 20 which lie on the SE–NW and NE–SW diagonals have been reduced to vectors (σ, β).

To reduce these to the cylindrical coordinates, we subtract 45° from β in 6 and 14, 135° from β in 8 and 16, 225° from β in 10 and 18, 315° from β in 12 and 20. Then the vector $[\sigma\ (\beta - a)]$ is resolved at once into u_2, v_2. Thus 15.7, 333° of Ci. 6, high, Table 44, becomes 15.7, 288°; thence $u_2=4.9$ $v_2=-14.9$, as in cirrus 6, high, Table 46, and as can also be verified on the Chart 16 *a*. In this way the coordinates of the anticyclonic and cyclonic components, Tables 46, 47, have been found. We have thus the data in such form that one more concentration can be made. If we assume that a symmetrical gyratory circulation is represented by the coordinates of Chart 16, it is now necessary simply to take the mean values of the cylindrical coordinates lying on each circle; that is to say, the mean of the areas 1–4, 5–12, 13–20, respectively. This has been done, and they are entered as I, II, III, in the next section of the same Tables 46, 47. The means of I, II, III, themselves, are also entered on the next line, as average values for the entire circulation in each cloud level. These can be most conveniently studied by reference to Charts 17, 18, where specimen vectors are plotted for the several levels.

The rectangular components were transferred to Chart 16

and drawn so that the vectors shall be central on the circles I, II, III, which run through the middle of the respective adopted subareas. In order to get some idea of the average cyclonic and anticyclonic vectors in the different levels, the mean values of the vectors found on the circles I, II, III, respectively, were taken, and these give the relations between the inner and the outer portions of the masses of air in motion in cyclones and anticyclones. They are shown in Charts 17 and 18. To secure one more concentration of the data, and to further eliminate the local defects, the nine levels were reduced to three by taking the means of the three upper, the the three middle, and the three lower strata together, respectively, and these are shown on Chart 19. The following small Table 7 gives the corresponding numerical results; it is Table 52 of the cloud report.

TABLE 7.—*Mean components grouped in three levels.**

MEAN ANTICYCLONIC COMPONENTS.

		I.	II.	III.
Upper level. Ci., Ci. S., Ci. Cu.	u_2	— 3.3	+ 3.9	+ 2.2
	v_2	— 4.5	— 5.2	— 4.8
	σ	5.6	6.5	5.3
	β	234	307	294
Middle level. A. S., A. Cu., S. Cu.	u_2	0.0	+ 4.2	— 0.8
	v_2	— 7.1	— 6.6	— 9.3
	σ	7.1	7.9	9.3
	β	270	303	265
Lower level. Cu., S., Wind.	u_2	+ 3.3	+ 3.0	+ 1.8
	v_2	— 4.1	— 7.0	— 6.2
	σ	5.3	7.6	6.4
	β	308	294	287

MEAN CYCLONIC COMPONENTS.

		I.	II.	III.
Upper level. Ci., Ci. S., Ci. Cu.	u_2	— 1.2	— 6.8	— 1.8
	v_2	+10.2	+12.3	+ 0.7
	σ	10.3	14.0	2.0
	β	96	119	161
Middle level. A. S., A. Cu., S. Cu.	u_2	— 7.3	+ 0.3	+ 1.6
	v_2	+18.6	+14.4	+ 5.2
	σ	20.0	14.4	5.5
	β	111	89	73
Lower level. Cu., S., Wind.	u_2	+ 0.3	— 2.4	— 1.5
	v_2	+ 7.9	+ 6.3	+ 3.8
	σ	8.0	6.7	4.2
	β	88	111	112

* Copy of Table 52.

It is evident that it would be of great advantage to meteorology to have similar observations continued systematically in the United States, so as eventually to obtain perfectly reliable vectors of motion throughout the atmosphere, and they should be extended to all parts of the world as rapidly as practicable. It is not very safe to draw conclusions extending to the entire atmosphere from the observations made at a few selected localities, such as those in the United States or Europe, but it seems to be necessary for us to do so in the present incomplete state of meteorology. Moreover, we must use the material we now have in discussing what are the fundamental principles of dynamics that can be admitted into the theory, and accordingly I shall proceed to take up the observed general circulation and the local circulations, and compare them with the existing theories in order to arrive at such views as will probably determine the theoretics of the dynamic meteorology of the future.

NOTES AND EXTRACTS.

MR. C. F. R. WAPPENHANS.

Mr. Carl F. R. Wappenhans, for many years a member of the Signal Corps and of the Weather Bureau, died at Arco, Switzerland, February 4, 1902. Mr. Wappenhans was born at Berlin, Prussia, in 1834, served as an officer in the United States Navy from 1862 to 1868, joined the Signal Corps on January 9, 1871, was placed on the retired list as first class sergeant on December 28, 1891, was appointed local forecast official in the Weather Bureau on the same date, and resigned on August 31, 1901. He was in charge of the station at Indianapolis, Ind., from January 30, 1871, until the date of his resignation, with the exception of four years, from 1879 to 1882, when he was in charge of Detroit, Mich. Mr. Wappenhans was a man of most kindly and genial disposition, and a faithful and efficient official.—*H. E. W.*

THE WEATHER OF THE MONTH.

By Prof. ALFRED J. HENRY, in charge of Division of Records and Meteorological Data.

CHARACTERISTICS OF THE WEATHER FOR FEBRUARY.

The weather of February, 1902, was much like that of February, 1901. In the interior low temperatures and great dryness prevailed while on both coasts the precipitation was above the seasonal average. A remarkable feature of the month was the persistence of a ridge-shaped area of high pressure that extended from Tennessee northwestward evidently beyond the field of observation. This ridge of high pressure seems to have been formed and maintained by the movement southeastward along the eastern slope of the Rocky Mountains in British Columbia of areas of high pressure of rather small extent, yet sufficient to prevent areas of low pressure from crossing the Rocky Mountains in the neighborhood of the forty-eighth parallel of latitude. All of the storms of the month therefore except the last one moved southeasterly over the Plateau region to the Texas coast, thence easterly along the Gulf coast, and northeastward along the Atlantic coast to New England. As in 1901 a great depression persisted over the North Atlantic off the Canadian Maritime Provinces. Pressure was also remarkably low off the north Pacific coast and the rainfall in that region was extraordinarily heavy. The temperature was

below the seasonal average in the southeastern part of the country and above in the northwestern part.

PRESSURE.

The distribution of monthly mean pressure is shown graphically on Chart IV and the numerical values are given in Tables I and VI.

The monthly mean pressure was three-tenths of an inch below the normal on the north Pacific coast and over two-tenths below the normal on the north Atlantic coast. It was also below the normal in the interior districts by amounts ranging from .03 to .20 inch.

The distinctive feature of the month was a ridge of high pressure that covered the middle Mississippi and Missouri valleys and stretched northwestward into British Columbia.

Not a single low crossed the Rocky Mountains in the neighborhood of the forty-eighth parallel of latitude.

As compared with the previous month, there was a marked fall in pressure in all districts, save in the extreme southern portion of California.

TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature, as deduced from the records of about 1,000 stations, is shown on Chart VI.

The month was unusually cold in the central valleys and the southeastern part of the country, where the negative departures ranged from 5° in Florida to 10° and over in the lower Ohio Valley, Tennessee, and the middle Mississippi Valley. In New England and thence westward, through the lower Lake region, to the Pacific coast, including all the country westward of the Rocky Mountains, temperature was above the seasonal average by amounts ranging from 4° in New England to 12° in the upper Mississippi Valley and 8° over the Plateau region.

The average temperature for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	26.3	0.0	— 1.0	—0.5
Middle Atlantic	12	29.2	—5.3	— 7.3	—3.6
South Atlantic	10	41.7	—7.9	—10.6	—5.3
Florida Peninsula	8	56.0	—5.8	— 8.2	—4.1
East Gulf	9	46.1	—8.5	—10.0	—5.0
West Gulf	7	46.7	—4.9	— 5.1	—2.6
Ohio Valley and Tennessee	11	28.4	—9.8	—10.5	—5.2
Lower Lake	8	21.9	—4.7	— 5.1	—2.6
Upper Lake	10	20.0	+0.9	+ 4.2	+2.1
North Dakota	8	11.9	+4.4	+13.1	+6.6
Upper Mississippi Valley	11	20.6	—5.5	— 1.2	—0.6
Missouri Valley	11	21.2	—3.2	+ 2.7	+1.4
Northern Slope	7	21.1	+4.8	+10.6	+5.3
Middle Slope	6	32.3	—0.2	+ 1.6	+0.8
Southern Slope	6	41.3	+0.3	+ 1.5	+0.8
Southern Plateau	13	43.1	+1.6	+ 3.8	+1.9
Middle Plateau	9	34.6	+6.7	+ 8.3	+4.2
Northern Plateau	12	35.6	+6.1	+ 7.9	+4.0
North Pacific	7	45.1	+4.6	+ 5.2	+2.6
Middle Pacific	5	51.6	+2.4	+ 1.2	+0.6
South Pacific	4	54.0	+0.6	+ 2.2	+1.0

In Canada.—Prof. R. F. Stupart says:

The mean temperature of the month was decidedly above average over the northern portions of the Dominion and above to a less extent in the southern portions, except in the southwestern counties of Ontario where it was from 1° to 3° below. In the extreme north of Quebec, Ontario, Manitoba, and in the Territories, the positive departures exceeded 12°; and that this wide difference from average probably extended to the Arctic Ocean is indicated by the Dawson City mean which was 8.8°, fully 12° or more above normal.

PRECIPITATION.

Heavy rains fell over a narrow strip of country, extending from southern Mississippi and Alabama northeastward into North Carolina, and torrential rains also fell on the Pacific coast from central California northward to the Straits of Fuca; elsewhere precipitation was below the seasonal average and this was particularly so in the Ohio Valley where less than one-half inch of precipitation was recorded during the month. Heavy snows fell over the mountain districts of California and Oregon. There was also more than the usual amount of snow in North Carolina, in the western portion of South Carolina, Tennessee, southern Missouri, and northern Arkansas. At the end of the month practically all of the snow had disappeared except in the mountain districts of Pennsylvania, western New York, New England, on the Upper Peninsula of Michigan, in the Missouri Valley and in the mountain districts of the West.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	8	4.07	114	+0.5	—1.3
Middle Atlantic	12	4.69	138	+1.3	+0.3
South Atlantic	10	4.53	121	+0.8	—1.9
Florida Peninsula	8	4.92	163	+1.9	—0.4
East Gulf	9	6.09	133	+1.5	—1.4
West Gulf	7	1.73	50	—1.7	—2.8
Ohio Valley and Tennessee	11	1.61	38	—2.6	—3.6
Lower Lake	8	1.21	45	—1.5	—2.4
Upper Lake	10	1.10	58	—0.8	—2.1
North Dakota	8	0.93	148	+0.3	—0.1
Upper Mississippi Valley	11	0.88	47	—1.0	—1.8
Missouri Valley	11	0.64	52	—0.6	—0.8
Northern Slope	7	0.33	62	—0.2	—0.7
Middle Slope	6	0.34	40	—0.5	—1.0
Southern Slope	6	0.08	8	—0.9	—1.7
Southern Plateau	13	0.61	60	—0.4	—0.9
Middle Plateau	8	1.37	117	+0.2	—0.4
Northern Plateau	12	2.44	149	+0.8	—0.4
North Pacific	7	12.11	198	+6.0	+3.3
Middle Pacific	5	10.46	258	+6.4	+2.5
South Pacific	4	4.04	155	+1.4	0.0

In Canada.—Professor Stupart says:

The rainfall seems to have been somewhat greater than average, both on Vancouver Island and the lower mainland of British Columbia. In the Northwest Territories the snowfall was above average over the larger part of Assiniboia and about average elsewhere, while in Manitoba there was a slight excess in the more western portions of the Province and a deficiency in the eastern portions. From Manitoba eastward to the Maritime Provinces there was a fairly general deficiency of precipitation, except a slight excess in the Ottawa Valley and in Cape Breton, in the first instance owing to the exceptionally heavy snowstorm of the 2d, and in the second to a large number of falls of rain or snow at intervals during the month.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 2, 5, 6, 14, 15, 16, 21, 25. Arkansas, 1, 2, 3, 5, 10, 13, 14, 15, 19, 20, 24, 27. California, 4, 7, 11, 16, 20, 25, 26, 27, 28. Colorado, 6, 15, 18, 22, 26, 27. Connecticut, 1, 2, 21, 22. Delaware, 20, 21. District of Columbia, 2, 20, 21. Florida, 4, 5, 9. Georgia, 5, 14, 15, 16, 20. Idaho, 5, 14, 15, 24, 26, 27, 28. Illinois, 2, 20, 28. Indiana, 1, 10, 19, 20, 21, 28. Indian Territory, 19. Iowa, 26, 27, 28. Kansas, 1, 12, 13, 14, 15, 19, 20, 28. Kentucky, 20, 21, 28. Louisiana, 3, 4, 5. Maine, 2, 18. Maryland, 1, 2, 3, 20, 21, 22. Massachusetts, 2, 17. Michigan, 7, 9, 13, 14, 28. Minnesota, 20, 26, 27, 28. Mississippi, 1, 4, 5, 14, 21. Missouri, 1, 5, 6, 13, 14, 19, 20, 28. Montana, 10, 16, 18, 26, 27, 28. Nebraska, 13. Nevada, 5, 7, 14, 17, 22, 25, 26, 27, 28. New Hampshire, 2, 17. New Jersey, 1, 2, 17, 21, 22. New Mexico, 25, 26, 27. New York, 2, 21, 22. North Carolina, 1, 2, 15, 16, 20, 21, 22, 25. North Dakota, 25, 26, 28. Ohio, 20, 21, 26, 27. Oklahoma, 14, 19, 20. Oregon, 4, 6, 7, 8, 27.

Pennsylvania, 1, 2, 20, 21, 22. South Carolina, 14, 15, 16, 17, 18, 20, 21, 22. South Dakota, 13, 15, 17, 18, 27. Tennessee, 13, 14, 17, 18, 19. Texas, 4, 5, 8, 19, 25. Utah, 5, 17, 22, 24, 25, 26. Vermont, 2, 3, 26. Virginia, 1, 15, 16, 17, 20, 21, 22, 27, 28. Washington, 4, 5, 6, 7, 8, 14, 15, 24, 25, 28. West Virginia, 1, 2, 21, 22, 25. Wisconsin, 27, 28. Wyoming, 8, 9, 13, 26, 28.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 5, 14, 15, 24, 27. Arizona, 26. Arkansas, 10, 13, 14, 17, 19, 20, 24, 27. California, 12, 25, 26, 27. District of Columbia, 28. Florida, 21, 24, 27, 28. Georgia, 21, 27, 28. Indiana, 28. Kentucky, 28. Louisiana, 6, 19, 23, 24, 27. Maryland, 28. Mississippi, 14, 27, 28. North Carolina, 28, Ohio, 28. Oregon, 4, 5, 7, 10, 12, 17, 25, 26, 27, 28. South Carolina, 27, 28. South Dakota, 26. Texas, 19, 23, 24. Utah, 17, 22, 24, 26, 27, 28. Washington, 6, 9, 20, 26, 27, 28. West Virginia, 28.

HUMIDITY.

The average by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	75	0	Missouri Valley	80	+ 3
Middle Atlantic	74	0	Northern Slope	78	+ 9
South Atlantic	72	— 6	Middle Slope	70	+ 4
Florida Peninsula	79	— 3	Southern Slope	56	—14
East Gulf	71	— 7	Southern Plateau	40	— 8
West Gulf	73	0	Middle Plateau	62	0
Ohio Valley and Tennessee	77	+ 3	Northern Plateau	79	+ 1
Lower Lake	82	+ 2	North Pacific	83	— 2
Upper Lake	82	+ 1	Middle Pacific	86	+10
North Dakota	79	— 2	South Pacific	79	+ 8
Upper Mississippi Valley	80	+ 3			

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the table below:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.6	+ 0.1	Missouri Valley	5.8	+ 0.4
Middle Atlantic	5.7	+ 0.1	Northern Slope	6.0	+ 1.2
South Atlantic	5.2	— 0.1	Middle Slope	5.3	+ 0.9
Florida Peninsula	4.9	+ 0.3	Southern Slope	4.8	0.0
East Gulf	6.3	+ 0.8	Southern Plateau	3.1	+ 0.1
West Gulf	5.8	0.0	Middle Plateau	6.3	+ 1.5
Ohio Valley and Tennessee	6.3	+ 0.1	Northern Plateau	8.1	+ 1.4
Lower Lake	6.8	0.0	North Pacific	8.3	+ 1.3
Upper Lake	5.9	— 0.4	Middle Pacific	7.9	+ 3.1
North Dakota	5.8	+ 0.7	South Pacific	5.4	+ 1.3
Upper Mississippi Valley	5.1	— 0.2			

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex	18	57	nw.	Mount Tamalpais, Cal	25	59	s.
Do	19	51	n.	Nantucket, Mass	2	53	w.
Do	26	67	sw.	Do	3	55	sw.
Block Island, R. I	2	72	w.	Do	17	64	e.
Do	3	70	w.	Do	22	50	ne.
Do	9	53	w.	Neah Bay, Wash	11	56	e.
Do	17	72	ne.	New Haven, Conn	3	52	w.
Do	18	50	nw.	New York, N. Y	2	74	w.
Buffalo, N. Y	2	54	w.	Do	3	62	w.
Do	3	63	w.	Do	8	53	nw.
Do	4	59	sw.	Do	9	55	nw.
Do	5	56	w.	Do	13	50	nw.
Do	7	50	w.	Do	18	62	nw.
Chicago, Ill	4	50	w.	Do	19	51	nw.
Cleveland, Ohio	28	64	se.	Do	28	68	se.
Columbia, S. C	28	52	sw.	Oswego, N. Y	3	52	nw.
Denver, Colo	27	50	nw.	Pensacola, Fla	27	52	sw.
Eastport, Me	2	54	e.	Point Reyes Light, Cal	14	55	se.
Do	17	54	ne.	Do	16	66	s.
El Paso, Tex	26	71	w.	Do	17	58	s.
Do	27	51	nw.	Do	20	63	se.
Do	28	56	nw.	Do	21	54	s.
Jacksonville, Fla	28	55	s.	Do	23	78	se.
Lexington, Ky	28	50	w.	Do	24	60	se.
Modena, Utah	26	54	nw.	Do	25	98	se.
Mount Tamalpais, Cal	16	60	sw.	Red Bluff, Cal	25	60	se.
Do	17	52	sw.	Winnemucca, Nev	12	52	sw.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively

Thunderstorms.—Reports of 975 thunderstorms were received during the current month as against 357 in 1901 and 104 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 28th, 337; 27th, 182; 26th, 75.

Reports were most numerous from: Georgia, 75; California, 63; Oregon, 58.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: 18th to 26th.

In Canada: A thunderstorm was reported from New Westminster on the 21st. Auroras were reported as follows: Port Arthur, 25th; Minnedosa, 2d, 7th; Qu'Appelle, 6th; Battleford, 2d, 3d, 8th, 11th; Port Simpson, 9th, 12th.

DESCRIPTION OF TABLES AND CHARTS.

By ALFRED J. HENRY, Professor of Meteorology.

For description of tables and charts see page 570 of REVIEW for December, 1901.

TABLE I.—*Climatological data for Weather Bureau Stations, February, 1902.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.							**26.3**	**0.0**										**75**	**4.07**	**+ 0.5**								**5.6**		
Eastport	76	69	74	29.66	29.75	— .23	24.0	+ 2.0	47	27	30	5	11	19	23	22	18	77	3.06	— 0.6	12	8,907	w.	54	e.	2	6	9	13	6.8	19.6
Portland, Me.	103	81	117	29.65	29.77	— .25	25.6	+ 1.0	55	27	32	6	12	19	21	23	18	74	3.34	— 0.1	7	7,113	nw.	40	w.	3	11	8	9	5.2	13.8
Northfield	876	15	65	28.85	29.83	— .21	17.1	+ 1.1	51	27	28	—15	7	7	38	14	10	78	2.37	+ 0.3	8	5,133	s.	36	nw.	19	5	10	13	6.8	27.7
Boston	125	115	181	29.64	29.79	— .25	28.8	+ 0.8	52	27	35	12	6	23	23	26	21	76	4.19	+ 0.7	11	9,832	w.	46	w.	3	11	8	9	5.0	13.0
Nantucket	12	43	85	29.76	29.77	— .27	30.0	— 1.0	48	28	35	16	6	26	14	27	23	76	2.87	0.0	13	12,896	w.	64	e.	17	8	8	12	6.2	10.6
Block Island	26	11	70	29.76	29.79	— .27	29.4	— 1.4	48	2	34	12	3	24	18	27	21	72	6.15	+ 1.8	10	16,923	w.	72	ne.	17	11	9	8	4.7	16.2
Narragansett		10					27.8	— 1.3	52	27	36	9	6	20	24				7.01	+ 2.5	8		nw.				13	5	10		24.5
New Haven	106	117	140	29.70	29.83	— .24	27.6	— 1.2	50	27	35	11	6	21	27	24	18	69	3.58	— 0.5	8	8,712	w.	52	w.	3	17	3	8	4.4	16.0
Mid. Atlantic States.							**29.2**	**— 5.3**										**74**	**4.69**	**+ 1.3**								**5.7**		
Albany	97	102	115	29.76	29.87	— .20	23.6	— 0.6	49	27	31	3	6	17	32	21	18	83	3.04	+ 0.4	10	5,699	nw.	47	w.	3	7	9	12	6.2	16.8
Binghamton	875	79	90	28.91	29.88	— .20	21.2	— 2.7	51	27	28	— 6	6	14	38				2.31	— 0.6	16	5,756	w.	35	w.	2	4	11	13	6.6	15.3
New York	314	108	350	29.49	29.85	— .23	28.5	— 3.0	54	28	34	11	5	23	16	26	21	73	5.78	+ 2.0	10	15,266	nw.	74	w.	2	8	9	11	5.8	13.4
Harrisburg	374	94	104	29.50	29.92	— .17	26.6	— 5.9	55	28	32	7	5	21	18				3.98	+ 1.2	8	7,686	nw.	49	w.	2	7	7	14	6.2	10.7
Philadelphia	117	168	184	29.75	29.89	— .21	29.7	— 3.8	60	28	36	12	5	24	20	26	22	74	5.49	+ 2.3	10	9,356	nw.	40	se.	28	9	7	12	6.0	14.3
Scranton	805	111	119	28.99	29.89	— .19	24.3		54	28	31	2	6	18	29	21	16	72	4.73		13	6,584	ne.	48	nw.	3	4	9	15	7.4	16.3
Atlantic City	52	68	76	29.81	29.87	— .24	29.0	— 4.9	51	28	34	12	5	24	19	26	22	76	5.53	+ 2.2	8	7,838	nw.	42	ne.	17	11	7	10	4.9	18.0
Cape May	17	47	51	29.88	29.90	— .21	29.2	— 6.5	50	28	34	14	6	24	16	27			5.46	+ 1.7	8	8,466	nw.	40	w.	2	13	5	10	4.9	9.5
Baltimore	123	68	82	29.76	29.90	— .21	30.4	— 5.8	59	28	36	13	5	24	19	27	22	75	4.68	+ 1.2	8	4,829	w.	33	w.	2	12	4	12	5.5	1.0
Washington	172	59	76	29.80	29.93	— .18	29.8	— 6.0	60	28	37	5	5	23	28	26	19	66	4.72	+ 1.4	9	7,079	nw.	40	nw.	2	12	4	12	5.2	1.5
Cape Henry		5	58				34.0	— 9.9	60	28	39	20	5	29	18				4.98	+ 1.4	10	11,538	nw.	48	nw.	22	11	7	10	5.3	4.1
Lynchburg	681	83	88	29.16	29.93	— .18	32.8	— 7.2	68	28	40	14	5	26	26	29	24	73	5.67	+ 2.1	9	4,456	nw.	36	nw.	2	8	8	12	5.9	2.0
Norfolk	91	102	111	29.80	29.91	— .20	35.8	— 7.0	66	28	42	18	14	30	24	32	26	73	4.66	+ 0.8	10	7,645	nw.	38	s.	28	15	5	8	4.5	8.8
Richmond	144	82	90	29.76	29.93	— .18	34.6		65	28	42	15	5	28	24				4.84		9	4,430	n.	38	sw.	28	10	7	11	5.6	9.8
S. Atlantic States.							**41.7**	**— 7.9**										**72**	**4.53**	**+ 0.8**								**5.2**		
Charlotte	773	68	76	29.08	29.93	— .19	36.6	— 8.4	69	28	44	17	5	29	22	32	26	69	6.07	+ 1.6	13	5,214	ne.	36	nw.	2	11	6	11	5.4	19.4
Hatteras		17	42	29.89			39.2	— 7.4	62	21	45	24	14	34	24	37	34	86	3.62	— 0.8	8	11,446	nw.	49	nw.	2	15	3	10	4.7	T.
Kittyhawk	8	12	30				37.1	— 8.9	60	2	42	20	14	32	20				5.19	+ 1.4	7	9,192	nw.				15	3	10	4.9	4.0
Raleigh	376	93	101	29.51	29.93	— .18	36.0	— 7.9	69	28	44	17	5	28	27	32	26	70	7.08	+ 3.3	11	5,085	nw.	30	sw.	28	11	7	10	5.1	17.9
Wilmington	78	82	90	29.84	29.93	— .19	41.4	— 8.4	68	27	50	23	14	33	27	36	29	67	3.29	+ 0.1	9	6,842	w.	45	w.	2	11	8	9	5.3	0.2
Charleston	48	14	92	29.90	29.95	— .17	44.4	— 8.4	65	26	52	27	11	37	27	39	35	75	2.92	— 0.4	9	7,903	nw.	43	s.	28	8	9	11	5.5	T.
Columbia	351	114	122	29.56	29.95	— .16	41.0	— 7.1	72	28	49	21	5	33	26	36	30	69	5.12	+ 0.9	10	6,162	w.	52	sw.	28	7	11	10	5.8	0.2
Augusta	180	89	103	29.75	29.95	— .17	43.2	— 7.2	70	27	52	23	11	34	31	38	33	74	6.02	+ 2.1	8	5,471	w.	39	w.	2	11	6	11	5.5	T.
Savannah	65	79	89	29.88	29.95	— .17	47.2	— 7.1	71	28	55	28	11	39	27	41	35	69	2.34	— 0.7	9	6,470	w.	42	w.	28	10	10	8	5.4	
Jacksonville	43	69	84	29.90	29.95	— .17	50.6	— 7.8	77	1	60	30	18	42	27	44	39	70	3.64	+ 0.5	9	6,260	w.	55	s.	28	10	9	9	4.9	
Florida Peninsula.							**61.5**	**— 6.6**										**79**	**1.75**	**— 2.4**								**4.9**		
Jupiter	28	10	30	29.94	29.97	— .11	62.0	— 5.1	82	28	70	38	11	54	27	56	53	80	4.64	+ 2.1	7	8,968	nw.	48	w.	26	9	15	4	4.7	
Key West	22	43	50	29.97	29.99	— .08	66.2	— 5.2	80	2	70	53	9	62	16	62	59	80	3.88	+ 2.2	6	7,408	nw.	36	ne.	9	15	9	4	4.1	
Tampa	34	60	67	29.94	29.98	— .12	56.2	— 6.6	78	1	64	34	11	48	34	50	46	77	5.72	+ 2.9	9	5,452	w.	49	s.	28	7	10	11	6.0	
East Gulf States.							**46.1**	**— 8.5**										**71**	**6.09**	**+ 1.5**								**6.3**		
Atlanta	1,174	190	216	28.70	29.96	— .16	37.1	—10.9	63	26	44	15	5	30	28	32	26	68	7.56	+ 2.9	10	10,956	nw.	48	nw.	2	6	8	14	6.7	0.4
Macon	370	96	99	29.56	29.96	— .16	43.0		70	27	52	22	11	34	35				5.15		9	5,909	nw.	36	se.	24	6	5	17	6.7	
Pensacola	56	78	96	29.93	29.98	— .13	49.3	— 7.5	72	1	57	28	11	42	25				5.74	+ 1.8	9	7,829	nw.	52	sw.	27	8	6	14	6.0	
Mobile	57	88	96	29.92	30.00	— .11	48.1	— 6.7	73	27	56	28	11	40	28	42	38	74	8.82	+ 4.1	10	6,275	n.	46	sw.	27	9	4	15	6.4	
Montgomery	223	100	112	29.74	29.98	— .14	44.2	— 8.5	69	28	52	21	11	36	32	39	33	69	8.72	+ 3.4	10	5,846	nw.	46	e.	20	7	7	14	6.3	
Meridian	375	84	93	29.59	30.00	— .11	42.1	—11.5	69	28	51	20	11	34	31				4.38	— 1.5	10	4,748	nw.	26	e.	19	9	6	13	5.9	T.
Vicksburg	247	62	74	29.72	29.98	— .12	44.2	— 8.4	69	27	52	23	3	36	31	38	32	68	2.42	— 2.2	7	5,685	nw.	40	nw.	14	7	7	14	6.3	
New Orleans	51	88	121	29.93	30.00	— .09	50.2	— 7.9	76	14	58	32	3	43	31	45	41	75	3.83	— 0.7	8	6,792	n.	35	se.	24	7	11	10	6.2	
Port Eads		27					53.3	— 6.3	73	1	61	36	*	46	26				7.24	+ 3.9	12		n.				3	8	17		
West Gulf States.							**46.7**	**— 4.9**										**73**	**1.73**	**— 1.7**								**5.8**		
Shreveport	249	77	84	29.72	30.00	— .09	45.4	— 5.8	68	28	54	23	3	37	30	41	37	75	2.27	— 1.9	7	5,458	nw.	36	s.	27	9	6	13	6.1	1.4
Fort Smith	457	79	94	29.51	30.01	— .09	36.5	— 5.0	61	26	44	12	2	29	29	32	26	71	1.08	— 2.5	5	6,776	e.	48	e.	19	5	13	10	6.0	6.0
Little Rock	357	93	100	29.64	30.04	— .07	36.1	— 9.3	65	27	42	16	3	30	25	32	28	74	2.16	— 3.2	5	5,841	ne.	36	se.	26	9	8	11	5.6	1.5
Corpus Christi	20	48	53	29.98	30.00	— .05	56.2	— 2.8	85	28	64	35	5	48	35	50	46	77	2.07	— 0.4	9	6,782	se.	42	nw.	27	12	9	7	4.6	
Fort Worth	670	106	114	29.28	30.02	— .05	46.0		81	22	57	15	2	35	39				0.36		2	8,660	nw.	38	sw.	26	3	15	10	6.3	2.0
Galveston	54	106	112	29.92	29.98	— .09	51.8	— 5.2	72	27	57	34	21	46	23	48	45	83	2.12	— 0.9	9	8,534	se.	39	nw.	23	9	9	10	5.8	
Palestine	510	73	79	29.46	30.00	— .08	47.4	— 3.6	72	13	56	26	3	39	34	41	36	70	1.83	— 1.7	7	6,533	s.	35	s.	26	6	6	16	6.8	2.5
San Antonio	701	80	91	29.25	29.98	— .07	53.5	— 2.3	83	26	64	31	15	43	35	44	35	59	0.55	— 1.4	7	6,029	nw.	48	nw.	27	9	11	8	5.5	
Taylor	583	55	63	29.38	30.01	— .05	49.4		81	26	60	25	2	38	39				0.90		5	7,348	n.	39	nw.	27	9	6	13	5.9	0.7
Ohio Val. and Tenn.							**38.4**	**— 9.8**										**77**	**1.61**	**— 2.6**								**6.3**		
Chattanooga	762	106	112	29.18	30.02	— .11	36.6	— 9.5	63	28	43	13	5	29	32	31	24	65	3.54	— 1.8	9	6,021	nw.	44	sw.	28	5	15	8	5.9	8.7
Knoxville	1,004	10	88	28.90	29.98	— .14	33.8	— 8.5	61	28	41	10	5	27	31	30	26	76	3.53	— 1.8	9	5,604	nw.	48	s.	28	7	4	17	7.1	8.2
Memphis	397	140	154	29.61	30.05	— .06	34.9	— 9.9	67	27	41	16	3	29	24	31	27	76	2.16	— 3.2	9	7,264	nw.	48	w.	27	4	12	12	6.7	0.1
Nashville	546	122	131	29.44	30.05	— .07	32.0	—10.7	62	28	39	10	3	25	26	28	24	74	2.20	— 3.1	8	5,367	nw.	38	sw.	28	7	11	10	5.9	9.8
Lexington	989	75	102	28.92	30.02	— .09	25.0	—11.0	57	28	32	3	3	18	26				0.90	— 2.8	10	7,344	w.	50	w.	28	8	10	10	5.4	4.0
Louisville	525	114	136	29.45	30.07	— .04	26.8	—11.4	56	28	34	4	3	20	25	24	20	78	0.62	— 3.7	11	6,374	n.	44	sw.	28	11	5	12	5.5	2.4
Evansville	431	72	82	29.57	30.06	— .05	27.6		56	26	34	5	5	21	23				0.51		4	4,691	nw.	23	sw.	28	10	6	12	5.2	0.5
Indianapolis	822	154	164	29.11	30.04	— .06	22.6	— 9.7	54	27	30	— 5	3	15	29	19	15	75	0.54	— 3.0	8	7,266	n.	44	s.	28	9	8	11	5.6	3.9
Cincinnati	628	152	157	29.33	30.04	— .06	25.1	—11.3	55	28	32	0	3	18	29	22	18	77	0.38	— 3.3	7	6,560	nw.	39	sw.	28	9	9	10	5.9	1.6
Columbus	824	87	100	29.09	29.99	— .10	23.2	— 8.9	57	27	31	— 4	3	16	30	21	18	82	0.51	— 3.2	8	5,919	w.	38	sw.	28	7	5	16	6.8	4.0
Pittsburg	842	116	123	29.02	29.95	— .14	26.7	— 6.7	64	28	34	2	5	20	25	23	19	76	1.45	— 1.4	16	5,184	nw.	31	nw.	2	5	10	13	6.6	3.5
Parkersburg	638	77	84	29.32	30.03	— .07	26.1	—10.2	63	28	33	4	3	20	27	24	21	84	1.83	— 1.2	13	4,986	w.	31	nw.	2	4	6	18	7.4	2.1
Elkins	1,940	41	50	27.83	29.95	— .15	23.6		62	28	31	— 5	20	16	41	21	18	84	2.86		20	3,838	w.	34	w.	2	2	7	19	7.7	11.0
Lower Lake Region.							**21.9**	**— 4.7**										**82**	**1.21**	**— 1.5**								**6.8**		
Buffalo	767	178	206	29.05	29.91	— .15	22.2	— 2.3	57	28	28	4	5	16	22	20	16	78	2.33	— 0.5	16	11,528	w.	63	w.	3	1	16	11	7.2	29.7
Oswego	335	76	91	29.49	29.87	— .19	22.5	— 2.1	46	28	28	— 4	6	17	23	21	19	85	1.78	— 0.8	14	9,409	se.	52	nw.	3	2	5	21	7.8	14.0
Rochester	523	81	90	29.31	29.90	— .16	22.4	— 2.0	55	28	29	3	5	16	26	20	17	81	2.51	— 0.2	11	7,665	sw.	42	w.	3	8	11	9	5.6	23.0
Erie	713	92	102	29.14	29.94	— .13	21.0	— 6.5	56	28	27	— 2	5	15	22	20	18	90	0.56	— 2.9	8	7,946	w.	48	s.	28	5	7	16	6.9	3.0
Cleveland	762	190	201	29.11	29.95	— .12	21.0	— 7.0	59	28	27	— 4	5	15	23	19	16	80	0.83	— 2.0	13	10,645	sw.	64	se.	28	2	11	15	7.2	9.2
Sandusky	629	62	70	29.28	29.98	— .09	21.5	— 7.4	58	28	28	— 4	5	15	22				0.30	— 2.6	7	5,596	sw.	33	sw.	28	4	8	16	6.9	3.5
Toledo	628	123	127	29.28	29.99	— .08	21.8	— 6.4	54	28	29	— 7	3	15	24	19	16	80	0.62	— 1.4	8	6,933	sw.	38	sw.	28	8	9	11	5.9	3.4
Detroit	730	153	190	29.14	29.97	— .09	22.6	— 3.6	54	28	29	— 4	5	16	19	20	17	82	0.72	— 1.6	7	7,993	w.	40	sw.	28	5	8	15	6.8	5.4
Upper Lake Region.							**20.0**	**+ 0.9**										**82**	**1.10**	**— 0.8**								**5.9**		
Alpena	609	63	80	29.25	29.93	— .10	19.8	+ 1.8	49	23	28	— 2	19	12	30	18	15	87	0.56	— 1.5	9	7,826	nw.	40	se.	28	6	8	14	6.4	4.0
Escanaba	612	43	57	29.27	29.97	— .09	18.4	+ 2.6	43	24	26	— 9	5	11	28	17	15	91	1.61	0.0	4	6,057	s.	29	se.	28	8	10	10	5.9	0.6
Grand Haven	632	54	92	29.26	29.98	— .07	22.1	— 2.9	46	27	29	0	14	15	35	20	17	85	1.48	— 0.7	12	7,660	w.	44	w.	4	8	5	15	6.6	9.9
Houghton	668	66	74	29.22	29.98	— .07	20.8		51	25	28	— 8	19	14	42				1.34		11	4,559	nw.	23	nw.	4	3	4	21	8.0	13.0
Marquette	734	79	116	29.12	29.96	— .09	21.6	+ 4.5	45	26	26	— 6	5	17	26	19	14	73	1.24	— 0.5	10	7,602	nw.	38	sw.	25	2	11	15	7.3	8.0
Port Huron	638	70	120	29.26	29.97	— .08	21.2	— 1.8	57	28	28	— 4	5	14	24	19	16	85	0.76	— 1.7	10	8,174	nw.	43	sw.	28	11	8	9	5.4	7.9
Sault Ste. Marie	614	40	61	29.22	29.92	— .11	17.3	+ 4.8	44	27	26	—10	14	9	34	16	13	84	0.58	— 0.7	6	5,447	nw.	30	w.	11	10	6	12	5.4	3.2
Chicago	823	241	274	29.10	30.04	— .04	20.8	— 6.0	48	26	26	— 7	5	15	23	19	17	85	1.53	— 0.7	15	10,279	w.	50	w.	4	12	9	7	4.7	5.5
Milwaukee	681	124	142	29.25	30.02	— .04	21.7	— 1.0	51	26	29	— 8	4	15	20	18	14	77	1.13	— 0.7	6	6,442	w.	33	e.	27	12	6	10	4.9	1.6
Green Bay	617	49	57	29.30	30.00	— .06	19.4	+ 3.2	50	26	28	— 8	4	11	28	16	11	75	1.39	— 0.9	5	6,571	sw.	32	w.	4	10	11	7	5.5	0.8
Duluth	702	95	116	29.20	30.02	— .06	18.0	+ 3.5	44	25	25	—14	4	11	24	15	11	78	0.70	— 0.4	4	6,979	sw.	42	nw.	11	12	8	8	5.0	3.8
North Dakota.							**12.1**	**+ 4.9**										**79**	**0.78**	**+ 0.2**								**6.8**		
Moorhead	905	54	60	29.02	30.08	— .03	13.9	+ 9.4	48	26	23	—20	5	5	29	13	11	90	0.62	— 0.2	5	5,982	nw.	34	nw.	28	8	9	11	5.9	4.2
Bismarck	1,674	16	29	28.21	30.10	— .02	11.6	+ 2.1	45	21	20	—26	4	3	40	10	2	64	0.21	— 0.4	5	5,520	nw.	37	nw.	28	10	5	13	5.6	1.7
Williston	1,875	15	31	28.00	30.08	— .03	10.8	+ 3.1	41	24	19	—30	4	2	35	10	7	82	1.52	+ 1.1	13	5,454	n.	39	w.	23	11	8	9	5.8	11.6

TABLE I.—*Climatological data for Weather Bureau Stations, February, 1902*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.												Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.						Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.					
Upper Miss. Valley.							**20.6**	**— 5.5**													**80**	**0.88**	**— 1.0**									**5.1**	
Minneapolis	.....	99	208			.....	18.2	+ 2.0	52	26	26	−15	2	10	25	.....	.....	.....				0.47	— 0.6	4	7,561	nw.	36	nw.	3	12	7	9	.....	4.4
St. Paul	837	114	124	29.10	30.04	— .05	17.8	+ 2.0	51	26	26	−14	5	10	28	16	13	82				0.68	— 0.2	5	5,263	nw.	24	nw.	4	13	10	5	4.5	5.3
La Crosse	714	70	86	29.26	30.08	— .00	17.0	— 3.1	53	26	26	−13	3	8	32	.....	.....	.....				0.73	— 0.4	6	4,130	s.	20	sw.	4	8	15	5	4.9	2.6
Davenport	606	71	79	29.36	30.05	— .05	17.4	— 7.9	52	26	26	— 8	4	9	30	15	13	86				0.96	— 0.6	7	4,628	w.	24	w.	3	11	8	9	5.2	1.6
Des Moines	861	84	88	29.13	30.10	— .01	19.8	— 3.3	56	26	28	— 9	4	11	26	18	14	80				0.52	— 0.8	7	4,791	nw.	27	nw.	3	9	11	8	5.4	1.3
Dubuque	698	100	117	29.26	30.06	— .03	17.6	— 5.0	48	26	27	−10	4	8	35	15	12	83				1.43	0.0	11	3,664	nw.	22	nw.	7	14	8	6	4.6	2.9
Keokuk	614	63	78	29.37	30.07	— .04	21.0	— 7.3	52	26	29	— 6	4	13	29	18	13	77				1.02	— 0.7	6	4,710	nw.	30	nw.	3	15	6	7	3.9	0.4
Cairo	356	87	93	29.67	30.06	— .06	28.8	—10.6	57	27	35	— 8	4	23	21	27	24	85				1.37	— 2.6	10	6,738	nw.	32	sw.	28	5	9	14	6.8	4.5
Springfield, Ill	644	82	93	29.34	30.06	— .04	20.6	— 9.7	50	27	28	— 6	4	13	29	18	14	78				1.01	— 2.4	9	6,375	nw.	32	nw.	3	11	7	10	5.4	3.5
Hannibal	534	75	110	29.49	30.10	— .01	21.6	— 8.9	50	26	30	— 8	3	13	30	.....	.....	.....				0.68	— 1.0	7	5,672	sw.	31	nw.	3	10	10	8	5.3	0.5
St. Louis	567	111	210	29.43	30.06	— .05	26.4	— 8.7	56	27	33	— 1	4	20	21	23	18	72				0.83	— 2.0	6	7,208	w.	35	sw.	28	8	9	11	5.6	1.7
Missouri Valley.							**21.2**	**— 3.2**													**80**	**0.64**	**— 0.6**									**5.8**	
Columbia	784	11	84	29.20	30.07	— .04	22.1	−13.1	60	26	31	−11	3	13	39	.....	.....	.....				0.90	— 1.7	6	5,617	nw.	32	nw.	3	7	6	15	6.5	4.3
Kansas City	963	78	95	29.06	30.10	— .01	23.4	— 7.6	55	26	31	— 7	4	16	25	21	16	75				0.97	— 0.8	4	4,894	nw.	30	nw.	3	9	9	10	5.4	6.6
Springfield, Mo.	1,324	98	104	28.58	30.04	— .07	25.8	— 8.9	51	26	33	— 3	4	19	29	24	21	82				2.18	— 1.3	9	7,439	nw.	30	se.	27	8	10	10	5.6	14.4
Topeka	.....	81	.....	.....	.....	.....	22.2	— 9.1	56	26	31	— 8	4	14	27	.....	.....	.....				0.51	— 1.0	7	5,441	nw.	30	nw.	28	6	9	13	6.3	5.0
Lincoln	1,189	75	84	28.75	30.07	— .03	22.5	— 0.9	59	26	31	−11	4	14	30	20	17	82				0.14	— 0.8	4	6,676	nw.	47	nw.	28	9	10	9	5.4	0.7
Omaha	1,105	115	121	28.85	30.08	— .03	21.3	— 3.7	58	26	29	−11	4	14	24	19	15	81				0.13	— 0.7	4	5,353	nw.	30	nw.	3	6	12	10	6.0	1.3
Valentine	2,598	39	40	27.20	30.02	— .07	22.0	+ 0.5	64	25	33	−24	2	11	42	20	17	82				0.20	— 0.5	5	6,222	nw.	40	nw.	28	4	14	10	6.3	3.4
Sioux City	1,135	96	164	28.81	30.09	— .03	18.8	— 0.2	51	26	26	−14	4	11	24	.....	.....	.....				0.39	— 0.3	4	7,890	nw.	46	nw.	28	10	7	11	5.5	2.7
Pierre	1,572	43	50	28.34	30.09	— .02	18.8	+ 3.4	62	25	27	−22	4	11	32	16	11	75				0.83	+ 0.4	9	4,874	e.	42	n.	28	5	5	18	7.2	8.7
Huron	1,306	56	67	28.62	30.09	— .03	16.6	+ 4.6	55	26	25	−20	4	8	25	15	12	84				0.39	— 0.2	5	7,305	nw.	38	nw.	28	6	18	4	5.1	2.7
Yankton	1,233	42	49	28.70	30.08	— .04	19.5	+ 0.3	57	26	28	−16	4	11	29	.....	.....	.....				0.53	— 0.2	5	4,988	w.	35	nw.	28	13	11	4	4.5	3.1
Northern Slope.							**21.1**	**+ 4.8**													**78**	**0.33**	**— 0.2**									**6.0**	
Havre	2,505	46	53	27.28	30.04	— .03	17.2	+ 4.0	50	24	26	−20	9	8	29	16	14	86				0.27	— 0.3	9	5,423	ne.	30	sw.	10	7	11	10	6.1	2.4
Miles City	2,371	42	50	27.42	30.01	— .08	22.8	+ 6.6	58	25	31	−18	2	14	32	20	18	91				0.31	— 0.2	9	3,465	n.	25	nw.	26	8	6	14	6.2	1.6
Helena	4,110	88	93	25.69	29.99	— .12	29.5	+ 7.8	52	16	37	−12	1	22	27	26	20	69				0.46	— 0.3	4	4,191	sw.	38	sw.	5	5	13	10	5.9	4.1
Kalispell	2,965	45	51	26.83	29.97	— .11	27.2	.....	50	21	34	−13	1	20	28	26	23	85				1.67	.....	16	2,508	w.	17	nw.	7	8	5	15	6.7	12.1
Rapid City	3,234	46	50	26.52	30.04	— .04	24.6	+ 4.0	58	25	34	−15	2	15	40	22	18	81				0.14	— 0.5	7	4,705	nw.	37	se.	17	8	8	12	6.3	1.4
Cheyenne	6,088	56	64	23.86	29.95	— .08	31.2	+ 3.9	57	12	41	−12	1	21	37	26	18	64				0.55	+ 0.2	8	8,147	nw.	46	w.	10	10	13	5	4.6	5.5
Lander	5,372	26	36	24.53	30.00	— .08	29.2	+ 6.2	58	16	42	−16	2	16	46	24	18	69				0.20	— 0.4	3	2,250	sw.	30	sw.	25	4	21	3	5.4	2.0
North Platte	2,821	43	52	27.03	30.06	— .01	26.6	+ 1.3	60	21	37	−14	2	16	40	23	19	77				0.35	— 0.1	5	5,281	w.	37	nw.	28	4	18	6	6.4	4.5
Middle Slope.							**32.5**	**— 0.2**													**70**	**0.34**	**— 0.5**									**5.3**	
Denver	5,291	79	151	24.61	29.95	— .06	37.0	+ 4.8	66	12	50	−10	2	24	55	29	21	59				0.38	— 0.1	5	5,447	sw.	50	nw.	27	11	11	6	4.9	6.1
Pueblo	4,685	80	86	25.17	29.94	— .06	37.0	+ 6.9	69	12	52	−10	2	22	49	29	19	55				0.35	— 0.1	7	5,002	nw.	38	nw.	5	6	19	3	5.2	2.9
Concordia	1,398	42	47	28.55	30.09	— .00	23.6	— 4.6	60	25	32	−10	2	15	28	20	18	84				0.19	— 0.8	4	4,438	n.	30	s.	25	7	11	10	5.8	1.8
Dodge	2,509	44	52	27.34	30.02	— .04	32.0	+ 0.2	68	21	44	−11	2	20	44	26	22	80				0.16	— 0.5	4	7,076	nw.	44	se.	25	11	8	9	5.1	1.5
Wichita	1,358	78	85	28.58	30.07	— .01	28.6	— 3.2	65	26	37	−12	2	20	32	24	20	74				0.75	— 0.5	8	5,962	n.	29	nw.	27	8	11	9	5.5	7.4
Oklahoma	1,214	54	62	28.69	30.00	— .07	35.4	— 5.1	72	26	47	5	2	24	40	30	25	71				0.20	— 0.9	2	7,486	n.	35	s.	26	11	9	8	5.2	1.4
Southern Slope.							**41.8**	**+ 1.0**													**56**	**0.16**	**— 1.2**									**4.8**	
Abilene	1,738	45	54	28.15	29.98	— .07	45.3	— 0.6	80	18	58	11	2	33	46	36	26	57				0.31	— 1.1	5	6,909	nw.	46	nw.	26	9	9	10	5.5	2.6
Amarillo	3,676	54	61	26.16	29.95	— .07	38.3	+ 2.7	70	21	52	2	2	25	42	29	20	55				T.	— 1.2	0	11,468	ne.	67	sw.	26	14	13	1	4.0	T.
Southern Plateau.							**46.4**	**+ 1.6**													**40**	**1.33**	**— 0.2**									**3.1**	
El Paso	3,762	10	110	26.14	29.93	— .02	51.4	+ 2.0	79	17	66	25	5	37	44	36	16	29				0.01	— 0.4	1	8,777	nw.	71	w.	26	16	9	3	3.1	T.
Santa Fe	7,013	47	50	23.16	29.97	— .01	35.9	+ 3.9	59	17	47	8	2	25	34	27	17	49				0.43	— 0.4	4	5,180	nw.	32	nw.	26	20	5	3	2.5	4.6
Flagstaff	6,907	12	25	23.30	29.98	— .02	32.2	+ 0.8	60	16	46	0	4	18	43	28	.....	.....				1.76	— 0.4	6	.....	w.	.....	.....	.....	17	6	5	3.6	13.1
Phoenix	1,108	47	57	28.83	30.00	+ .01	56.4	+ 2.1	81	16	71	31	1	42	39	43	28	41				0.10	— 0.6	1	2,990	e.	32	w.	26	16	4	8	3.6	
Yuma	141	16	50	29.84	29.99	— .01	58.9	+ 0.3	86	16	74	32	1	43	39	47	33	46				T.	— 0.5	0	3,875	w.	40	w.	26	22	4	2	1.4	
Independence	3,910	51	58	25.96	29.97	— .09	43.6	+ 0.8	71	11	56	21	1	31	41	35	16	36				1.69	+ 1.1	3	5,000	s.	48	w.	12	10	13	5	4.6	
Middle Plateau.							**37.8**	**+ 4.5**													**62**	**1.20**	**+ 0.1**									**6.3**	
Carson City	4,720	82	92	25.21	29.96	— .12	40.0	+ 3.5	66	16	49	15	3	31	36	35	30	68				1.71	+ 0.2	10	5,732	sw.	48	sw.	12	9	6	13	5.7	10.3
Winnemucca	4,344	59	70	25.54	29.97	— .12	38.0	+ 5.5	67	16	48	5	2	28	37	34	28	69				1.47	+ 0.5	10	7,012	sw.	52	sw.	12	4	5	19	7.9	2.9
Modena	5,479	10	38	24.58	30.00	— .04	34.9	.....	65	16	48	0	3	22	41	28	17	51				0.32	.....	3	6,940	w.	54	nw.	26	4	12	12	6.2	0.9
Salt Lake City	4,366	105	110	25.59	30.01	— .07	39.0	+ 6.1	62	16	46	12	1	31	24	33	26	62				1.17	— 0.1	8	3,709	se.	34	n.	17	5	9	14	6.5	3.8
Grand Junction	4,608	43	51	25.36	30.08	+ .04	34.3	+ 3.0	58	17	46	— 4	3	22	36	27	19	59				0.44	— 0.2	4	2,981	nw.	23	n.	28	9	11	8	5.4	0.6
Northern Plateau.							**37.0**	**+ 7.7**													**79**	**2.56**	**+ 0.9**									**8.1**	
Baker City	3,471	53	58	26.35	29.99	— .13	34.8	+ 9.8	51	22	41	— 2	1	28	23	31	27	76				2.28	+ 0.6	18	3,437	se.	25	sw.	17	1	1	26	9.1	8.2
Boise	2,739	61	68	27.13	30.04	— .08	39.4	+ 4.7	62	17	48	1	1	31	25	35	31	74				3.02	+ 1.4	14	3,169	se.	28	e.	25	2	5	21	8.3	6.5
Lewiston	757	52	61	29.13	29.96	— .15	39.2	.....	58	18	47	— 5	1	32	24	.....	.....	.....				1.72	+ 0.5	12	2,202	e.	21	w.	25	5	2	21	7.5	0.3
Pocatello	4,482	46	54	26.43	30.03	— .07	35.1	+12.1	54	11	42	−11	1	28	30	32	29	81				2.07	+ 0.2	12	6,911	se.	36	s.	25	2	4	22	8.4	3.2
Spokane	1,943	99	107	27.88	29.97	— .12	36.0	+ 7.1	52	16	42	— 6	1	30	27	33	30	80				3.71	+ 1.7	20	3,073	e.	20	sw.	17	2	3	23	8.7	8.0
Walla Walla	1,000	65	73	28.85	29.93	— .18	39.6	+ 4.2	68	16	46	0	1	33	29	37	35	85				2.58	+ 1.2	18	4,091	s.	30	sw.	17	4	13	11	6.4	0.6
N. Pac. Coast Reg.							**45.1**	**+ 4.6**													**83**	**12.11**	**+ 6.0**									**8.3**	
Neah Bay	50	7	50	29.66	29.71	— .29	44.0	+ 3.0	56	16	47	33	*	41	12	43	41	89				25.75	+15.5	25	7,838	e.	56	e.	11	3	0	25	8.7	T.
Port Crescent	259	13	20	29.47	29.71	— .32	41.2	+ 3.4	54	20	47	26	1	36	17	.....	.....	.....				10.50	+ 5.8	20	2,038	sw.	16	sw.	4	1	7	20	8.7	T.
Seattle	123	114	151	29.69	29.83	— .23	46.4	+ 6.5	63	19	52	30	1	41	21	43	39	79				8.10	+ 4.4	21	5,287	se.	35	sw.	25	2	10	16	7.4	0.5
Tacoma	213	113	120	29.59	29.82	— .24	45.2	+ 6.3	65	16	52	28	1	39	27	.....	.....	.....				7.78	+ 2.4	21	4,021	sw.	36	sw.	4	1	5	22	8.3	0.2
Astoria	20	57	64	.....	.....	.....	46.6	+ 3.6	64	16	52	32	1	41	20	.....	.....	.....				16.33	+ 8.6	25	.....	s.	.....	.....	.....	1	4	23	8.8	
Portland, Oreg	154	203	213	29.69	29.85	— .23	44.6	+ 3.4	66	15	50	25	2	39	23	42	40	84				8.66	+ 2.5	23	6,384	se.	44	s.	17	1	5	22	8.6	0.4
Roseburg	518	56	67	29.30	29.87	— .23	47.9	+ 5.8	74	16	55	29	3	41	32	44	41	80				7.67	+ 2.8	22	2,829	se.	24	sw.	27	0	14	14	7.8	
Mid. Pac. Coast Reg.							**51.6**	**+ 2.4**													**86**	**10.46**	**+ 6.4**									**7.9**	
Eureka	62	62	80	29.88	29.95	— .16	52.2	+ 6.0	72	19	58	38	2	47	28	49	45	80				19.49	+13.4	24	6,167	s.	46	se.	23	3	6	19	7.4	
Mount Tamalpais	2,375	11	18	27.54	30.03	— .07	44.4	.....	59	19	48	34	2	41	15	44	43	94				12.73	.....	23	14,721	s.	60	sw.	16	1	7	20	8.2	
Red Bluff	332	50	56	29.64	30.00	— .11	50.2	+ 1.2	65	16	55	33	1	45	22	48	46	86				12.16	+ 8.5	23	6,953	se.	40	se.	25	2	6	20	8.4	
Sacramento	69	106	117	29.98	30.05	— .04	52.0	+ 2.2	72	16	58	32	1	46	24	49	47	83				6.52	+ 3.4	19	7,690	se.	60	se.	25	3	7	18	7.7	
San Francisco	155	161	167	29.90	30.07	— .03	52.9	+ 1.2	65	15	57	40	3	48	13	51	49	88				7.27	+ 3.6	19	6,740	se.	49	s.	25	2	7	19	8.1	
Point Reyes Light	.....	10	30	.....	.....	.....	50.8	+ 1.5	59	28	54	42	*	48	13	.....	.....	.....				6.84	+ 3.0	19	16,195	se.	98	se.	25	5	4	19	7.8	
S. Pac. Coast Reg.							**54.0**	**+ 0.6**													**79**	**4.04**	**+ 1.4**									**5.4**	
Fresno	330	67	70	29.72	30.08	.00	52.6	+ 2.4	80	16	62	29	1	43	31	48	44	75				2.44	+ 1.3	14	3,765	nw.	30	sw.	21	6	8	14	6.6	
Los Angeles	338	74	82	29.72	30.08	+ .02	54.5	+ 0.1	77	19	64	37	1	45	36	49	46	81				3.35	+ 0.1	7	2,832	w.	20	nw.	28	5	17	6	5.3	
San Diego	87	94	102	29.98	30.08	+ .02	54.8	0.0	71	19	61	39	1	49	23	50	47	80				1.57	— 0.7	8	3,768	nw.	32	s.	26	18	7	3	3.4	
San Luis Obispo	201	10	46	29.90	30.13	+ .02	54.0	— 0.3	74	15	63	32	1	45	33	49	46	80				8.79	+ 5.0	11	3,316	w.	26	s.	21	6	7	15	6.5	
West Indies.																																	
Basseterre	29	41	54	29.99	30.02	— .03	76.8	.....	84	19	82	66	8	72	16	71	69	78	0.34	.....	5	5,759	e.	23	e.	21	19	9	0	3.0	
Bridgetown	30	57	65	29.96	29.99	.00	77.9	.....	86	24	84	69	7	72	17	71	68	72	0.46	— 1.5	9	6,177	e.	24	e.	25	12	12	4	3.9	
Cienfuegos	52	62	67	29.93	29.98	— .05	69.6	.....	84	3	79	49	12	60	27	64	61	81	1.68	.....	6	5,073	ne.	26	se.	28	17	9	2	3.5	
Grand Turk	11	6	20	30.01	30.02	— .04	75.0	.....	87	27	82	60	15	68	22	.....	.....	.....	0.60	.....	7	.....	se.	.....	.....	.....	7	11	10	5.8	
Havana	57	87	105	29.93	29.99	— .05	68.9	— 3.1	84	2	76	53	13	62	23	64	63	85	2.16	— 0.1	7	7,591	e.	48	se.	20	13	11	4	4.2	
Kingston	286	38	52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port of Spain	40	65	66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Puerto Principe	352	55	62	29.64	30.01	— .03	71.6	.....	89	28	84	50	12	60	31	64	62	82	0.51	.....	4	4,215	ne.	31	s.	28	17	6	5	3.7	
Roseau	25	37	47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Juan	82	48	90	29.92	30.01	— .04	77.2	.....	89	18	84	66	3	70	18	71	68	77	0.09	— 2.3	2	6,344	se.	27	se.	25	21	6	1	3.0	
Santiago de Cuba	82	46	52	29.89	29.98	— .05	73.8	.....	88	2	83	61	19	65	24	67	65	80	0.44	.....	3	4,428	se.	30	se.	28	10	8	10	5.2	
Santo Domingo	57	37	44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Willemstad	75	39	46	29.83	29.91	— .02	79.5	.....	85	18	84	72	2	75	10	72	70	76	0.50	.....	2	8,158	e.	29	e.	10	5	23	0	5.0	

NOTE.—The data at stations having no departures are not used in computing the district averages. *More than one date.

TABLE II.—*Climatological record of voluntary and other cooperating observers, February, 1902.*

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Ashville	64	11	37.2	6.60	
Benton				7.93	
Bermuda	71	22	45.2	11.03	
Birmingham	66	17	40.8	6.64	
Bridgeport				4.11	10.0
Burkville				6.66	
Calera				7.49	
Camphill	67	20	42.3	8.78	
Citronelle	71	25	48.2	8.13	
Clanton	63	19	41.3	7.24	
Cordova				6.40	
Daphne	70[e]	23[e]	48.4[e]	6.45	
Decatur	66	17	37.8	4.08	
Demopolis				5.10	
Eufaula *a*	70	24	44.6	11.28	
Eutaw	71	19	40.6	3.71	
Evergreen	68	23	44.2		
Flomaton	71	22	47.8	9.87	
Florence *a*				3.14	
Florence *b*	65	11	36.6	3.29	
Fort Deposit	67	22	42.2	9.75	
Gadsden	69	18	37.8	6.88	
Goodwater	63	16	39.0	5.96	
Greensboro	68	20	40.6	5.28	
Greenville				9.53	
Hamilton	65	14	36.8	3.37	T.
Highland Home	70	21	44.8	10.29	
Letohatchee				7.66	
Livingston *a*	65	21	39.8	3.11	
Lock No. 4	65	19	38.8	6.86	
Madison Station	65	15	36.7	4.60	T.
Maplegrove	66	15	35.9	5.59	2.5
Marion	66	18	41.2	7.10	
Mount Willing	69	23	45.6	9.89	
Newbern	70	20	42.6	5.23	
Newburg	65	14	36.7	2.71	T.
Oneonto	64	12	36.8	6.40	T.
Opelika	65	20	42.0	10.75	
Oxanna	71	18	41.1	4.92	T.
Pushmataha	70	20	43.7	3.42	
Riverton	66	13	34.4	3.21	0.4
Scottsboro	62	15	35.4	4.73	1.2
Selma	66	21	42.5	6.01	
Talladega	65	17	41.4	6.58	
Tallassee				9.62	
Thomasville	65	22	45.2	6.22	
Tuscaloosa	61	17	38.1	5.77	
Tuscumbia	60	16	34.9	3.21	
Tuskegee	69	19	44.8		
Union Springs	65	22	43.5	15.40	
Uniontown	65	19	43.3	6.86	
Valleyhead	60	12	36.8	4.60	1.0
Verbena				7.28	
Wetumpka	66	21	44.9	9.54	
Alaska.					
Juneau	50	21	35.7	2.08	11.5
Killisnoo	45	19	32.6	2.65	9.0
Sitka	51	26	39.6	2.25	5.5
Arizona.					
Agua Caliente	86	25	54.6	T.	
Allaire Ranch				0.05	
Arizona Canal Co's Dam	80	29	55.8	0.15	
Aztec [*1]	81	32	55.8	0.00	
Benson [*1]	72	23	51.0	0.00	
Bisbee	75	30[d]	50.4	0.00	
Buckeye	85	28	54.2	0.10	
Casagrande [*1]	64	38	52.2	0.00	
Champie Camp	90	29	54.2	0.70	
Cochise [*5]				0.00	
Congress	76	30	53.4	1.05	
Dragoon Summit [*]	62	23	42.4	1.15	
Dudleyville	81	25	51.7	0.17	
Duncan	75	16	44.4	0.40	
Fort Defiance	57	— 3	31.1	0.65	3.0
Fort Grant	83	23	52.4	0.40	
Fort Huachuca	74	23	53.8	0.00	
Fort Mohave	85	25	55.6	0.00	
Globe	78	23	49.5	0.33	
Ingleside	82	29	54.7	T.	
Jerome	67	29	46.6	1.30	
Kingman	78[d]	23[d]	50.8[d]	1.80	
Mesa	80	28	52.9	0.08	
Mohawk Summit [*1]	86	31	61.8	0.02	
Mount Huachuca	75	22	50.1	T.	
Natural Bridge				0.85	
Oracle	69	23	48.5	0.65	
Oro				0.59	
Parker	88	22	57.0	0.04	
Phoenix	83	28	55.0	0.09	
Pima	77	20	49.8	0.04	
Pinal Ranch				1.03	
Prescott	70	9	39.5	0.65	T.
St. Johns	70	8	39.2	0.05	0.5
San Carlos	84	24	50.7	0.20	
Sentinel [*1]	82	36	59.8	T.	
Showlow				0.14	T.
Signal	88	15	53.0	0.12	
Silverking				0.45	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
Superstition				0.21	
Taylor	68	10	38.8	0.07	1.0
Tombstone	74	21	50.0	T.	
Tonto	77	24	49.4	0.68	
Tuba	68	12	39.8	T.	
Tucson	81	24	52.6	T.	
Vail [*5]	80	35	58.6	0.00	
Walnut Grove				0.10	
Willcox [*]	72	19	42.5	0.00	
Yarnell				1.15	T.
Arkansas.					
Alco	62	8	30.8	3.71	11.5
Amity	66	15	37.3	3.30	T.
Arkansas City				3.27	
Batesville	68	10	32.6	3.89	1.4
Beebranch	63	10	34.0		
Blanchard Springs	69	18	42.1	4.63	T.
Brinkley	68	14	35.0	4.38	1.0
Camden *a*				3.30	
Camden *b*	69	20	39.8	3.21	
Conway	68	10	35.6	3.38	4.8
Corning	61	— 2	27.9	3.29	12.5
Dallas	64	14	37.4	2.87	4.0
Dardanelle				0.92	4.0
Dutton	63	3	31.1	1.71	6.4
Elon	72	18[d]	42.2[d]	2.15	
Fayetteville	67	1	32.0	1.79	9.2
Forrest City	58	14	32.8		
Fulton				2.45	
Helena *a*				2.04	
Helena *b*	48[d]	12	31.6[d]	1.73	
Ione	62	10	35.0	1.60	6.0
Jonesboro	67	12	34.0	3.93	
Keesees Ferry	57	2	31.6	2.73	9.3
Lacrosse	66	8	29.6	2.55	
Lutherville	67	9	34.2	1.84	8.5
Malvern	67	15	38.6	2.10	T.
Marianna	57	14	33.2	1.77	T.
Marvell	70	14	35.9	1.49	0.2
Mount Nebo	58	10	31.6	3.64	6.0
New Gascony	70	17	37.0	3.80	
Newport *a*				3.28	1.5
Newport *b*	67	10	31.7	2.32	
Newport *c*	67	12	31.8	2.86	1.0
Oregon	58	4	29.8	3.42	8.8
Osceola	66	11	34.0	3.77	11.0
Ozark	60	12	35.4	2.04	6.0
Pinebluff	72	17	35.5	2.93	
Pocahontas	63	2	29.7	3.11	1.0
Pond	60	0	30.6	1.07	6.5
Prescott	68	20	39.8	1.74	T.
Rison	67	14	39.8	2.86	
Rosadale	66	18	40.8	3.85	0.5
Russellville	63	13	34.8	2.02	3.5
Silversprings	50	3	31.2	1.16	9.7
Spielerville	62	13	36.2	2.53	6.0
Stuttgart	71	16	35.7	2.61	
Texarkana	68	21	43.6	0.50	
Warren	69	16	40.0	3.80	
Washington	66	20	40.7	1.50	
Wiggs	63	11	36.8	3.84	3.0
Winchester	71	20	37.5		
Winslow	60	2	30.2	1.94	8.0
Witts Springs	56	5	29.5	3.00	8.0
California.					
Angiola	85	26	51.2	1.62	
Azusa	82	32	54.8	2.97	
Bakersfield	88	24	52.8	1.29	T.
Ballast Point L. H				1.28	
Bear Valley				25.46	56.5
Berkeley	64	38	52.1	10.47	
Bishop	74	18	42.3	0.55	
Boca [*1]	48	10	33.2	2.50	25.0
Bodie	50	— 6	25.8	2.24	22.5
Bowman	54	14	35.8	21.08	83.5
Branscomb				44.35	T.
Caliente [*1]	90	32	53.4	3.80	
Campbell	76	31	53.0	5.21	
Campo				4.72	
Cape Mendocino L. H				17.40	
Cedarville	66	10	38.6	2.19	8.0
Chico [*1]	67	32	52.6	8.53	
Cisco [*1]	46	16	31.4	14.17	121.5
Claremont	82	30	50.9	2.72	
Corning [*1]	66	30	48.7	11.00	
Crescent City	64	34	49.4	27.85	
Crescent City L. H				22.30	
Cuyamaca [*5]	64	14	37.8	7.50	
Delano [*1]	82	30	55.0	1.44	
Delta [*1]	58	30	47.6	39.82	
Drytown	73	28	50.8	8.00	
Dunnigan [*1]	68	32	52.2	9.19	
Durham [*5]	68	35	51.6	11.05	
East Brother L. H				17.40	
Edmanton [*1]	57	20	36.0	25.42	66.0
Elcajon	82	30	52.9	2.49	
Elmdale	80	25	51.8	3.49	
Elsinore	88	27	53.0	2.03	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Escondido	78	26	51.8	3.54	
Fallbrook	76	31	50.8	3.48	
Folsom City [*]	77	36	53.5	8.00	
Fordyce Dam				20.08	140.0
Fort Bragg				16.84	
Fort Ross	64	38	51.8	25.26	
Foster				4.40	
Georgetown	67	27	44.6	16.95	1.0
Gilroy (near)	75	28	53.2	5.33	
Glendora				3.09	
Goshen [*5]	78	28	52.6	2.34	
Grass Valley				20.18	1.0
Greenville	65	18	40.6	13.31	7.5
Hanford	84	32	54.7	2.00	
Healdsburg	65	29	52.0	24.76	
Hollister	72	28	52.4	3.92	
Humboldt L. H				17.30	
Idylwild	69	16	42.2	5.25	
Imperial	87	29	60.0	T.	
Indio [*1]	86	34	57.1	0.20	
Iowa Hill [*1]	66	34	45.9	15.75	1.5
Irvine	82	42	59.0	2.35	
Jackson	67	26	45.8	9.36	
Jolon				6.49	
Kennedy Gold Mine	66	24	44.5	10.67	
Kent	64	30	51.6	28.32	
Kernville				6.36	
King City [*1]	76	32	56.0	4.17	
Kono Tayee	63	35	48.7	10.28	
Lamesa				3.35	
Laporte [*1]	52	22	34.9	33.50	145.9
Las Fuentes Ranch				4.36	
Legrande	76	25	50.2	3.41	
Lemoncove	87	32	54.2	3.04	
Lemoore [*5]	77	24	51.9	1.69	
Lick Observatory	55	29	40.0	9.42	
Lime Point L. H				7.13	
Lodi	73	29	52.4	6.71	
Los Gatos *b*	69	34	51.9	14.49	
Mammoth [*1]	82	39	57.8	0.00	
Manzana	72	26	50.2	1.52	
Mare Island L. H				7.63	
Merced	79	23	48.5	2.26	
Mercury				24.75	
Mills College				9.25	
Milo				6.47	
Milton (near)	72	35	52.4	6.32	
Modesto [*1]	80	35	55.6	4.51	
Mohave [*1]	75	30	49.7	0.86	
Mokelumne Hill [*5]		33	46.6	8.38	
Monterio	74	30	48.8	5.65	
Monterey [*1]	63	37	53.8	3.87	
Mount St. Helena				33.28	
Mutah				3.23	4.0
Napa *b*	63	31	51.6	12.16	
Needles	78	36	61.0	0.00	
Nevada City	68	25	44.0	18.28	2.0
Newhall [*1]	84	25	50.3	2.90	
Niles	72	30	53.6	5.80	
North Bloomfield	66	24	42.2	18.04	7.5
North Ontario	78	33	51.2	2.92	
North San Juan [*1]	65	33	49.5	19.50	2.5
Oakland	67	37	53.6	9.73	
Ogilby [*1]	87	42	62.2	0.00	
Oleta [*1]	70	30	47.5	8.84	T.
Orland [*1]	70	33	51.8	11.31	
Palermo	71	30	51.3	10.83	
Paso Robles	72	24	49.2	5.32	
Peachland [*5]	64	34	53.2	20.39	
Piedras Blancas L. H				8.96	
Pigeon Point L. H				3.10	
Pilot Creek				20.77	16.0
Pine Crest	74	39	54.6	4.96	
Placerville	67	24	47.1	10.15	
Point Ano Nuevo L. H				7.48	
Point Arena L. H				15.07	
Point Bonita L. H				9.94	
Point Conception L. H				3.65	
Point Fermin L. H				3.22	
Point George L. H				15.14	
Point Hueneme L. H				4.48	
Point Lobos	61	40	51.8	6.13	
Point Loma L. H				0.44	
Point Montara L. H				8.57	
Point Pinos L. H				4.54	
Point Sur L. H				7.16	
Pomona (near)	81	30	54.2	3.35	
Poway				2.64	
Quincy	63	22	41.0	17.01	9.0
Redding	63	31	49.4	19.97	
Redlands	82	33	53.2	2.58	
Reedley	84	28	54.0	1.96	
Represa	70	32	52.3	8.78	
Riovista	73	31	53.2	5.62	
Riverside	85	28	52.9	1.81	
Roe Island L. H				5.07	
Rohnerville	70	38	51.8	21.18	
Rosewood	62	26	48.0	14.38	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Sacramento	72	32	53.0	7.08	
Salinas *1	70	35	54.4	3.50	
Salton *5	88	31	63.0	T.	
San Bernardino	88	26	53.6	3.02	
San Jacinto	85	29	52.4	1.57	
San Jose				4.42	
San Leandro	71	34	53.2	7.12	
San Luis L. H.				6.11	
San Mateo *1	70	37	52.2	7.41	
San Miguel *1	71	28	51.0	3.65	
Santa Barbara	72	37	54.8	4.40	
Santa Barbara L. H				3.94	
Santa Clara				4.72	
Santa Cruz	68	28	50.3	14.74	
Santa Cruz L. H.				13.67	
Santa Maria	74	28	53.6	4.03	
Santa Monica	69	35	50.8	3.92	
Santa Paula	75	36	55.4	4.49	
Santa Rosa *1	71	31	55.6	14.40	
Shasta	64	31	48.0	34.22	
Sierra Madre	75	36	53.0	3.38	
Snedden				2.90	6.0
Sonoma				12.11	
S. E. Farallone L. H.				6.49	
Stockton	69	30	51.0	5.06	
Storey	72	29	48.8	3.19	
Summerdale	62	20	37.8	13.02	38.0
Susanville	61	18	39.7	5.14	9.0
Tehama *1	69	36	51.6	8.14	
Tejon Ranch	83	37	54.6	1.46	
Templeton *	60	27	43.6	5.22	
Trinidad L. H				36.15	
Truckee *1	48	8	30.9	3.30	33.0
Tulare *b*				2.15	
Tulare *c*	92	24	54.4	2.28	
Ukiah	65	29	49.8	19.41	
Upperlake	66	27	47.6	12.82	
Upper Mattole *1	61	34	48.6	40.84	
Vacaville *	66	34	52.6	12.83	
Ventura	72	39	54.1	3.83	
Visalia	86	28	53.3	2.22	
Volcano Springs *1	87	34	60.4	T.	
Wasco		35		1.63	
Westpoint				9.58	3.0
West Saticoy				3.85	
Wheatland	70	29	51.5	7.78	
Williams *1	66	38	55.5	5.67	
Wilmington *1	75	45	54.9	2.82	
Wire Bridge *5	72	31	50.6	12.79	
Yerba Buena L. H				7.40	
Yreka	65	24	44.7	6.68	T.
Zenia				34.55	1.0
Colorado.					
Alford	59	—17	32.6	0.25	3.5
Arkins				0.13	2.5
Ashcroft	50	— 8 *h*	22.8 *h*	1.85	29.5
Blaine	73	— 9	36.4	0.44	4.8
Boulder	65	— 8	38.0	0.48	6.5
Boxelder				0.51	4.2
Breckenridge	47	—13	20.2	0.84	14.8
Buenavista				0.13	2.0
Canyon	69	—12	39.6	0.14	1.0
Castlerock	67	—10	34.4	0.39	6.4
Cedaredge	64	— 2	36.2	0.94	9.2
Cheyenne Wells	67	—11	33.2	0.25	2.5
Clearview	52	— 3	27.0	1.18	17.8
Collbran	60	— 9	31.4	0.23	3.5
Colorado Springs	64	— 8	34.1	0.25	4.5
Delta	62	— 9	33.2	0.20	T.
Durango	61	— 7	32.6	0.84	8.0
Fort Collins	63	—23	32.0	0.15	2.2
Fort Morgan	65	—22	32.5	T.	T.
Fox	66	—16	31.8	0.47	6.0
Garnett	56	—13	26.2	0.00	
Gilman				1.07	17.0
Gleneyre	67	—12	34.0	0.70	6.0
Glenwood				0.50	6.5
Greeley	64	— 1	33.8	0.16	2.0
Grover				T.	T.
Gunnison	53	—26	29.8	0.67	10.6
Hamps	68	—17	32.8	0.13	2.0
Hoehne	74	— 8	38.2	0.41	4.0
Holly	72	— 8	36.2	0.37	3.0
Holyoke (near)	63	—24	29.2	0.75	9.0
Husted	65	—15	31.8	0.27	9.0
Lake Moraine	47	—10	24.2	0.54	13.5
Lamar	76	— 8	38.4	0.64	8.5
Laporte				0.10	1.5
Las Animas	70	—11	36.8	0.50	3.0
Lay	56	—17	28.8	0.64	10.5
Leadville (near)				0.76	12.0
Leroy	63	—13	30.6	0.72	7.0
Longs Peak	49	— 5	27.0	0.03	1.0
Marshall Pass				1.92	39.0
Meeker	55	—20	30.4	0.78	10.1
Mitchell				0.85	16.0
Montrose				0.58	4.0
Moraine	51	— 3	30.4	0.04	0.8

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Parachute	58	—11	33.4	0.71	1.0
Perrypark				1.38	19.5
Rangely	62	—12	31.2	0.62	3.9
Rockyford	72	— 9	37.8	0.57	0.5
Rogers Mesa	64	— 5	32.8	0.93	8.6
Ruby				2.46	37.0
Russell	53	—17	23.6	0.44	7.0
Saguache	64	—12	29.4	0.13	2.0
Salida	63	5	34.0	0.08	1.0
San Luis	60	—15	29.3	0.15	1.7
Santa Clara	58	0	32.8	2.00	22.0
Sapinero				2.04	25.0
Seibert				0.68	5.0
Silt	58	— 1	32.4	0.67	6.7
Sugarloaf	51 *g*	— 6 *g*	27.6 *g*	0.31	5.0
Trinidad	71	0	39.4	0.88	4.0
Twinlakes				0.16	3.2
Vilas				0.27	3.5
Wagon Wheel	56	—28	20.2	0.14	3.0
Walden	48	— 7	25.4	0.18	3.2
Wallet				0.12	2.0
Westcliffe	57	— 9	29.6	0.17	2.8
Whitepine	45	—20	17.7	1.78	22.3
Wray	66	—15	31.5	0.74	9.0
Yuma				0.56	7.5
Connecticut.					
Bridgeport	56	10	27.8	5.58	18.2
Canton	56	0	23.4	5.98	31.0
Colchester	55	8	27.0	5.10	33.0
Falls Village				4.38	26.5
Hartford *b*	52	10	26.8	6.84	30.5
Hawleyville	54	4	24.6	4.32	18.2
Lake Konomoc				4.02	
Middletown	59	5	26.1	5.84	34.0
New London	49	11	26.4	3.85	26.5
North Grosvenor Dale	56	1	25.7	5.91	
Norwalk	57	0	26.3	4.62	13.5
Southington	55	0	25.1	4.55	24.5
South Manchester				5.05	28.0
Storrs	52	4	25.2	5.11	19.2
Voluntown	52	3	26.4	6.72	36.5
Wallingford				6.40	33.0
Waterbury	57	5	25.7	6.67	30.0
West Cornwall	57	0	23.1	4.90	30.5
West Simsbury				5.06	27.0
Winsted	56	0	22.1		
Delaware.					
Milford	60	7	30.3	5.30	18.0
Millsboro	56	6	28.0	4.31	16.0
Newark	54	8	27.4	4.66	4.5
Seaford	62	8	30.0	5.01	15.0
District of Columbia.					
Distributing Reservoir *5	59	7	29.2	2.74	
Receiving Reservoir *5	56	3	28.8	2.55	
West Washington	60	4	29.8	4.85	2.7
Florida.					
Archer	81	27	53.3	3.06	
Avon Park	84	33	58.8	5.49	
Bartow	86	32	59.0	5.70	
Bonifay	74	25	50.6	10.52	
Brooksville	79	31	52.8	4.99	
Carrabelle	72	28	51.8	4.65	
Clermont	84	34	58.4	7.29	
De Funiak Springs	75	23	48.6	10.57	
Deland	81	30	53.7		
Eustis	83	33	56.6	4.37	
Federal Point	80	28	52.3	3.72	
Fernandina	77	29	49.9	4.03	
Flamingo	85	38	63.8	0.90	
Fort Meade	84	29	57.4	6.95	
Fort Myers	82	36	58.9	6.79	
Fort Pierce	82	31	57.6	3.72	
Gainesville	85	28	52.6	3.43	
Holt	71	24	46.4	3.30	
Huntington	82	29	53.2	4.60	
Hypoluxo	85	38	63.6	5.54	
Inverness	81	27	52.4	5.25	
Jasper	76	27	50.1	6.52	
Kissimmee	83	33	57.1	6.07	
Lake Butler *f*	79	22	52.3	3.23	
Lake City	78	28	51.4	4.24	
Macclenny	80	22	51.1	3.93	
Malabar	83	30	58.6	4.49	
Manatee	83	34	58.0	5.96	
Marco	83	43	62.4	3.43	
Marianna	73	27	47.1	6.15	
Merritt Island	80	35	57.2	3.84	
Miami	87	37	63.4	5.91	
Micanopy	81	28	53.4	4.55	
Middleburg	75	22	49.6	3.93	
New Smyrna	84	28	54.5	4.75	
Nocatee	83	32	58.8	5.66	
Ocala	84	26	53.8	4.03	
Orange City	84	25	56.1	3.88	
Orlando	81	35	56.9	4.50	
Plant City	83	27	56.0	4.78	
Quincy	79	24	48.2	6.34	
Rockwell	81 *f*	28 *d*	55.4 *e*	2.75	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Florida—Cont'd.	°	°	°	*Ins.*	*Ins.*
St. Andrews	76	25	50.0	3.80	
St. Augustine				2.89	
St. Leo	83	29	56.0	4.77	
Sumner	79	24	51.1	3.51	
Switzerland	80	27	51.8	2.46	
Tallahassee	73	26	49.7	6.70	
Tarpon Springs	81	31	55.2	4.54	
Titusville	82	30	55.6	5.02	
Waukeenah	71	26	49.0	4.70	
Wausau	74	23	49.4	6.47	
Wewahitchka	75	21	46.8	4.79	
Georgia.					
Adairsville	62	16	37.4	6.29	2.5
Albany	63	29	44.8	9.26	
Allapaha	76	22	46.8	6.80	
Allentown	70	22	44.4	5.24	T.
Alpharetta	65	14	37.4	6.85	2.0
Americus	69	22	43.2	8.41	
Bainbridge	75	30	49.6	7.57	
Blakely	71	30	47.4	9.22	
Bowersville	64	16	37.4	8.59	7.5
Brent	67	17	42.0	10.07	1.6
Camak	68	18	40.3	8.77	
Canton				10.21	3.0
Carlton				9.08	3.5
Clayton	59	12	36.5	9.63	14.0
Covington	66	17	38.2	13.42	1.0
Dahlonega	65	13	37.2	8.06	9.0
Diamond	60	11	34.2	3.36	10.0
Douglas	75	24	47.0	7.80	
Dublin				3.75	
Eastman	70	23	44.6	5.78	
Elberton	66	16	41.0	9.94	5.0
Experiment	64	17	40.0	12.80	
Fitzgerald	73	22	45.8	5.17	
Fleming	74	21	47.3	2.37	
Fort Gaines	69	26	45.5	6.98	
Gainesville	59	15	35.5	9.40	4.5
Gillsville	66	13	39.4	10.06	6.0
Griffin	66	18	39.0	12.79	
Harrison	71	22	44.5	5.20	
Hawkinsville	72	24	44.3	5.03	
Hephzibah	70	27	44.6	6.80	T.
Jesup	73	26	47.7	4.08	
Lost Mountain	68	11	37.6	7.78	2.0
Louisville	69	22	42.7	4.26	0.3
Lumpkin	68	21	45.6	7.51	
Marshallville	68	23	44.6	5.96	
Mauzy	73	21	47.8	5.76	
Milledgeville	67	22	41.0	6.43	T.
Millen	72	23	44.5	3.96	
Morgan	76	24	45.0	7.76	
Naylor	75	23	47.2	5.70	T.
Newnan	62	16	37.1	9.07	
Oakdale				6.85	1.8
Point Peter	66	14	37.2	8.33	3.0
Poulan	73	23	46.4	7.19	
Putnam	69	21	45.3	6.63	
Quitman	74	25	48.0	5.37	
Ramsey	61	13	37.2	5.26	5.0
Resaca				6.77	4.0
Rome	65	16	38.2	7.49	2.0
St. Marys	79	26	49.0	4.16	
Statesboro	69	23	45.8	5.10	
Talbotton	67	19	43.0	9.30	
Thomasville	71	26	48.8	6.18	
Toccoa	63	16	38.6	9.44	10.0
Valona	78	23	47.4	3.40	
Vidalia	70	21	44.7	4.38	T.
Washington				10.15	1.0
Waverly	83	24	49.8	4.59	
Waycross	75	26	47.6	4.32	
Waynesboro	69	23	42.2	3.48	T.
Westpoint	67	20	42.8	11.94	
Woodbury	66	17	40.4	16.48	
Idaho.					
Albion	60	7	38.0	1.84	2.0
American Falls	58	—10	33.6	2.30	
Blackfoot	55	—13	33.6	1.12	7.5
Burnside	40	—13	25.2	1.25	12.5
Challis	43	—11	25.6	1.00	9.0
Chesterfield	45	—25	26.6	0.90	8.0
Downey	59	— 5	32.7	0.80	
Forney		—26		2.87	25.0
Garnet	63	5	40.9	1.69	0.9
Grangeville	60	— 4	37.4	0.71	7.0
Hailey	47	—10	29.7	4.79	21.8
Idaho City	59	—15	32.6	3.77	
Lake	42	—20	21.4	0.70	7.0
Lakeview	52	5	34.2	4.40	12.0
Lost River	49 *e*	—17 *e*	28.1 *e*	0.74	5.1
Moscow	58	— 3	36.2	3.49	6.0
Murray	49	— 8	32.1	4.33	30.0
Oakley	60	— 4	36.2	0.60	1.0
Ola	55	—15	35.6	5.76	4.9
Paris	63	—12	31.6	1.19	
Payette	59	8	38.2	3.83	3.0
Pollock	62	3	41.2	1.67	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Idaho—Cont'd.	°	°	°	*Ins.*	*Ins.*
Porthill	46	5	31.6	3.31	16.5
Priest River	49	− 8	32.4	3.91	15.0
Riddle	....	− 8	....	0.90	1.0
St. Maries	56	− 5	36.1	3.80	3.5
Silver City	51	7	32.1	5.65	53.5
Soldier	45	−10	27.2	3.10	26.2
Swan Valley	50	−15	28.6	0.53	2.2
Vernon	44	−35	26.3	0.67	2.9
Weston	58	− 4	33.8	1.41	3.0
Illinois.					
Albion	55	− 1	25.2	0.86	2.5
Aledo	53	−12	17.4	0.82	1.0
Alexander	51	−14	19.6	0.97	2.5
Antioch	48	− 9	18.1	1.40	T.
Ashton	48	−13	16.4	1.36	3.8
Astoria	51	−10	19.3	1.68	4.0
Aurora	50	−12	18.2	2.05	3.9
Benton	55	2	27.8	0.80	1.0
Bloomington	51	−10	19.0	1.75	4.3
Cambridge	51	− 8	18.6	1.36	3.8
Carlinville	53	−11	21.9	0.86	3.0
Centralia	57	0	26.2	0.95	2.0
Charleston	....	....	....	1.96	3.9
Chemung	50	−12	16.6	0.80	0.5
Chester	....	....	....	1.39	5.0
Cisne	56	− 1	25.6	1.00	1.5
Coatsburg	52	− 9	21.0	1.11	0.2
Cobden	55	3	26.6	2.53	4.0
Danville	50	−10	21.4	0.27	1.3
Decatur	50	−12	19.0	1.42	2.5
Dixon	52	−12	17.0	1.05	2.6
Dwight	49	−10	18.5	1.43	2.0
Effingham	62	− 8	24.2	0.40	1.5
Equality	57	2	26.2	1.03	2.1
Flora	54	− 1	24.6	0.94	1.0
Friendgrove[*5]	54	0	23.3	0.59	1.2
Galva	51	− 12	16.8	1.29	3.8
Grafton	....	....	....	0.96	2.5
Greenville	54	− 6	22.4	1.37	6.2
Griggsville	50	− 7	21.6	1.53	....
Halfway	55	3	26.4	0.74	2.7
Halliday	56	3	29.0	0.97	....
Havana	50	−12	20.4	1.42	2.1
Henry	51	−10	17.6	1.60	4.5
Hillsboro	52	− 6	21.0	0.89	2.7
Joliet	44	−10	15.6	1.43	4.6
Kishwaukee	50	−12	15.5	1.63	4.0
Knoxville	51	−12	17.4	1.42	1.5
Lagrange	49	−10	18.9	1.34	3.3
Laharpe	54	−16	19.0	1.30	1.5
Lanark	50	−13	14.8	1.27	1.7
Lasalle	49	− 8	18.6	1.75	4.0
Loami	....	....	....	1.06	3.0
McLeansboro	54	3	26.8	0.96	1.5
Martinsville	....	....	....	1.14	3.5
Martinton	56	−14	17.8	1.81	5.5
Mascoutah	55	− 4	24.3	0.83	2.9
Mattoon	54	− 2	25.8	1.95	1.5
Melrose	51	− 5	22.8	....	....
Minonk	48	−12	16.8	1.41	3.5
Monmouth	52	−11	17.3	0.99	1.7
Monticello	50	−11	16.4	1.24	4.0
Morgan Park	....	....	....	1.14	3.1
Morrison	50	−13	16.0	1.62	6.2
Morrisonville	50	−12	20.0	0.93	2.4
Mount Carmel	....	....	....	1.10	3.9
Mount Pulaski	52	−11	20.2	1.40	8.3
Mount Vernon	55	0	26.6	0.92	1.0
New Burnside	55	2	27.4	0.77	0.5
Olney	54	− 2	25.0	0.69	1.6
Ottawa	50	− 7	19.4	1.41	7.2
Palestine	54	− 5	23.8	1.43	3.6
Pana	50	−11	20.4	0.96	1.0
Paris	50	− 4	19.6	1.20	.....
Peoria[a]	....	....	....	1.21	.....
Peoria[b]	52	− 6	21.0	1.41	2.1
Philo	49	−12	17.1	1.56	5.5
Plumhill	54	− 3	24.5	0.58	1.5
Rantoul	50	−11	18.4	1.90	6.3
Raum	55	3	26.3	1.80	4.5
Riley	48	−11	17.8	1.42	3.7
Robinson	52	− 2	23.6	0.95	3.0
Rushville	50	−10	20.6	1.47	0.9
St. Charles[*5]	46	−12	17.6	2.03	2.3
St. John	55	0	25.7	1.16	2.0
Scales Mound	50	−14	15.8	1.71	4.2
Shobonier	56	− 8	22.4	1.07	2.0
Strawn	50	−12	16.8	1.70	2.0
Streator	50	−10	18.4	1.32	3.2
Sullivan	51	−11	19.5	1.18	3.5
Sycamore	53	−11	18.2	2.72	4.3
Tilden	54[c]	− 1	26.9[d]	0.76	1.2
Tiskilwa	49	−11	17.2	1.46	2.5
Tuscola	51	−11	19.1	1.61	2.8
Walnut	51	−10	18.8	1.38	3.9
Wellington	48	−12	17.4	0.57	0.2
Winnebago	50	−13	16.2	1.43	4.0
Yorkville	50	−10	16.6	2.05	5.0
Illinois—Con'd.					
Zion	49	−13	17.2	1.80	4.5
Indiana.					
Anderson	55	− 7	20.7	0.54	3.9
Angola	50	− 9	21.6	1.32	5.8
Auburn	54	− 9	20.0	0.63	2.6
Bedford	54	0	22.8	0.52	3.0
Bloomington	56	− 2	24.8	2.50	6.0
Bluffton	57	−11	19.8	0.51	3.5
Butlerville	54	− 3	22.8	1.69	5.5
Cambridge City	54	− 6	19.2	0.38	1.8
Columbus	54	− 4	23.6	0.64	2.5
Connersville	54	− 6	21.8	0.45	1.2
Crawfordsville	53	− 4	22.6	0.66	0.8
Delphi	54	−12	16.4	1.39	9.0
Edwardsville[*1]	55	2	28.6	0.94	2.5
Fairmount	58	−10	20.4	....	....
Farmland	58	− 5	21.8	0.63	4.7
Fort Wayne	54	−12	19.0	0.97	5.4
Franklin[*1]	52	− 1	24.5	0.48	2.5
Greencastle	49	− 4	21.0	1.05	4.7
Greensburg	54	− 5	21.1	0.10	T.
Hammond	50	−11	15.8	2.62	12.0
Hector	55	−11	20.4	....	....
Huntington	56	− 9	20.0	1.09	6.5
Jeffersonville	55	3	26.1	0.63	2.0
Knightstown	55	− 6	22.6	1.10	3.5
Kokomo	56	− 7	21.2	0.96	6.0
Lafayette	52	−12	19.3	1.82	10.5
Laporte	53	− 9	21.2	1.85	14.8
Logansport	57	−11	20.0	0.61	4.6
Madison[a]	55	0	25.8	0.63	1.8
Madison[b]	....	....	....	0.36	.....
Marion	58	−10	20.3	0.82	5.0
Markle	57	−12	19.0	0.51	5.5
Mauzy	53	− 7	20.6	0.56	3.5
Moores Hill	54	−12	22.9	0.30	3.0
Mount Vernon	56	4	26.0	0.82	1.5
Northfield	52	−10	18.3	0.70	6.0
Paoli	54	− 2	23.8	0.87	4.0
Prairie Creek	52	− 5	22.1	0.78	3.0
Princeton	54	0	20.2	0.90	6.0
Rensselaer	52	−13	18.0	1.81	9.2
Richmond	59	− 5	21.8	0.36	T.
Rockville	51	− 8	20.5	1.32	6.0
Salem	55	− 1	25.2	0.96	1.5
Scottsburg	54	1	26.0	1.10	2.5
Seymour	53	− 1	23.2	1.23	8.0
South Bend	50	−11	19.4	1.45	11.5
Syracuse	50	−11	18.6	2.37	13.0
Terre Haute	53	− 3	23.4	0.99	4.8
Topeka	49	− 6	19.5	1.06	7.0
Valparaiso	50	−12	17.2	0.83	2.5
Veedersburg	56[d]	−11[d]	21.2[d]	1.34	7.5
Vevay	55	3	26.6	0.75	2.5
Vincennes	56	1	23.9	0.98	1.5
Washington	55	1	25.2	1.64	4.0
Worthington	52	− 3	21.4	0.82	2.2
Indian Territory.					
Ardmore	78	16	41.4	0.25	....
Bengal	66	10	38.0	0.55	5.5
Chickasha	74	6	38.2	0.08	T.
Durant	75[c]	14	41.0	0.85	0.5
Fairland	61	0	30.8	1.32	8.0
Hartshorne	67	10	37.8	1.42	7.0
Healdton	78	8	40.0	0.20	2.0
Holdenville	70	8	36.8	0.13	1.3
Marlow	74	7	37.4	0.06	T.
Muscogee	77	7	34.6	0.45	4.5
Ryan	79	10	42.0	0.10	1.0
South McAlester	....	....	....	0.79	6.5
Tahlequah	62	6	35.2	1.26	9.5
Tulsa	....	....	....	0.70	5.2
Webbers Falls	64	11	36.4	0.56	6.0
Iowa.					
Afton	53	−13	18.8	0.40	.....
Albia	55	−10	19.8	0.92	0.9
Algona	51	−16	18.6	0.50	4.0
Alta	54	−18	17.2	0.40	2.5
Amana	50	−13	16.4	1.10	1.2
Ames[b]	49	−12	15.3	0.38	1.4
Atlantic	55	−13	17.2	0.59	4.5
Baxter	55	−13	17.4	0.75	0.0
Belknap	54	−10	17.7	0.69	3.0
Belleplaine	53	−11	18.4	2.39	4.9
Bonaparte	55	−14	18.6	0.55	.....
Britt	55	−18	16.1	0.47	1.0
Buckingham	....	....	....	1.06	2.2
Burlington	57	− 7	21.6	1.16	1.2
Bussey	....	....	....	1.52	1.0
Carroll	55	−15	18.6	0.30	.....
Cedar Rapids	49	−11	15.6	0.90	2.5
Centerville	53	−11	19.6	1.14	1.0
Chariton	57	−11	18.4	1.15	1.8
Charles City	45	−15	13.6	0.33	1.0
Clarinda	59	−13	20.0	0.30	3.4
Clearlake	59	−16	20.4	0.66	1.6
Clinton	50	−11	16.8	1.18	2.5
Columbus Junction	57	− 8	19.3	0.92	1.5
Corning	54	−17	16.4	0.50	4.0
Council Bluffs	58	−11	21.3	0.06	0.9
Cumberland	....	....	....	0.21	1.0
Danville	....	....	....	1.28	.....
Decorah	47	−15	14.6	1.35	4.8
Delaware	46	−14	14.2	1.09	2.0
Denison	54	−15	17.3	0.14	1.5
De Soto	55	− 8	21.0	0.25	0.5
Dows	50	−18	14.6	0.54	2.0
Eldon	53	−14	18.4	0.72	1.4
Elkader	53	−15	16.4	1.19	6.0
Estherville	54	−15	17.4	0.29	1.7
Fairfield	55[c]	−11[c]	18.9[c]	0.74	.....
Fayette	48	−16	13.0	1.48	1.9
Fonda	....	....	....	0.88	2.4
Forest City	51	−17	16.4	0.40	1.5
Fort Dodge	52	−16	16.3	0.40	
Fort Madison	....	....	....	1.52	0.5
Galva	54[c]	−21[c]	16.8[c]	0.20	2.0
Gilman	....	....	....	0.89	.....
Glenwood	57	−13	19.9	0.29	3.0
Grand Meadow	46	−15	14.6	1.97	4.2
Greene	47	−17	15.0	0.89	3.0
Greenfield	53	−15	18.0	0.38	3.2
Grinnell	51	−10	17.8	1.23	3.3
Grinnell (near)	52	−11	16.9	1.13	5.0
Grundy Center	48	−17	15.0	0.79	0.5
Guthrie Center	55	−12	18.2	0.16	1.5
Hampton	49	−16	17.2	0.87	1.2
Harlan	53	−15	17.8	0.15	2.0
Hopeville	....	....	....	0.61	.....
Humboldt	62	−18	20.6	1.29	T.
Independence	45	−15	13.6	1.10	2.0
Indianola	57	−12	18.6	0.72	2.2
Iowa City	53	−15	16.7	0.85	1.8
Iowa Falls	47	−15	14.5	0.84	3.0
Jefferson	....	....	....	0.37	1.2
Keosauqua	55	−15	19.2	0.77	1.3
Lacona	....	....	....	1.25	3.5
Larchwood	45	−19	18.8	0.50	.....
Larrabee	51	−19	17.8	0.60	4.0
Leclaire	....	....	....	1.03	4.8
Lemars	54	−16	18.0	0.20	2.0
Lenox	53	−18	17.2	0.20	1.2
Logan	55	−15	19.3	0.50	5.0
Maple Valley	....	....	....	0.30	3.0
Maquoketa	50	−13	16.1	1.31	.....
Marshalltown	48	−12	17.6	0.72	1.2
Monticello	46	−14	15.6	0.92	1.0
Mountayr	56	−15	17.5	0.67	3.5
Mount Pleasant	55	−15	17.8	0.87	.....
Mount Vernon	50	−14	16.6	0.70	2.3
New Hampton	44	−18	12.8	0.74	4.0
Newton	55	−13	17.9	0.72	1.0
Northwood	51	−13	17.3	0.77	1.5
Odebolt	53	−16	18.6	0.30	3.0
Ogden	55	−16	17.6	0.15	1.0
Olin	46	−15	13.8	0.94	4.2
Onawa	52	−13	20.4	0.36	3.2
Osage	46	−14	14.8	0.70	3.0
Oskaloosa	55	−12	18.4	0.88	2.2
Ottumwa	54	− 8	20.2	1.50	2.0
Ovid	56	−14	18.8	1.16	2.0
Pacific Junction	57	−16	20.7	0.08	0.5
Pella	56	−12	19.7	0.84	.....
Perry	55	−14	18.0	0.36	.....
Plover	55	−20	16.4	0.60	3.5
Primghar	50	−19	17.4	0.30	3.0
Redoak	55	− 9	21.4	0.29	3.5
Ridgeway	51	−15	18.0	2.28	4.9
Rockford	....	....	....	0.08	0.3
Rockwell City	46	−18	17.8	0.20	2.0
Ruthven	....	....	....	0.46	3.5
Sac City	52	−17	17.4	0.18	1.8
St. Charles	56	−12	20.2	0.61	3.5
Scranton	47	−12	18.0	1.10	1.0
Sheldon	51	−19	17.2	0.65	4.5
Sibley	46	−20	15.2	0.40	4.0
Sigourney	57	−12	19.0	0.90	1.0
Sioux Center	49	−18	17.4	0.65	6.5
Spirit Lake	52	−20	17.4	0.20	2.0
Stockport	....	....	....	0.53	1.5
Storm Lake	50	−19	16.2	0.32	1.2
Thurman	61	−15	22.2	0.02	0.4
Tipton	48	−12	16.6	0.55	0.5
Villisca	56	−17	18.5	0.60	6.0
Vinton[*1]	47	− 9	16.1	1.13	1.0
Wapello	53[c]	− 9[c]	18.6[c]	0.90	T.
Washington	55	....	....	1.01	.....
Washta	....	....	....	0.45	4.0
Waterloo	48	−11	15.6	1.47	3.5
Waverly	46	−12	15.2	1.39	3.2
Westbend	54	−17	18.0	0.67	5.0
Westbranch	53	−15	16.1	0.82	1.7
Whitten	49	−14	15.9	0.10	T.
Wilton Junction	52	−15	17.0	0.96	2.5
Winterset	50	−12	19.6	0.47	3.0
Woodburn	....	....	....	1.15	2.5

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas.	°	°	°	*Ins.*	*Ins.*
Achilles	69	−15	29.4	0.38	3.8
Anthony				0.65	6.0
Atchison	57	−10	22.6	0.39	3.5
Beloit	59	−13	23.8	0.34	3.0
Burlington	61	− 7	24.2	2.60	16.0
Chanute	63	− 4	28.3	1.22	11.0
Colby	69	−15	30.3	0.36	4.2
Columbus	61	− 2	27.2	2.15	7.1
Delphos	63	−17	24.2	0.43	4.5
Dresden	67	−12	30.1	0.59	5.9
Ellinwood	62	−16	26.9	0.70	5.0
Emporia	60	− 6	25.6	1.20	12.0
Englewood	73	− 7	33.8	0.40	4.0
Eureka Ranch	69	−15	28.9	0.59	5.8
Fallriver	62	− 5	27.9	1.35	9.0
Farnsworth *1	64	− 2	29.9	0.40	4.5
Fort Leavenworth	59	− 8	24.2	0.10	1.0
Fort Scott	62	− 4	24.0	2.83	18.0
Frankfort	59	−12	21.6	0.16	0.6
Garden City	74	−12	34.0	0.87	5.2
Grenola	64	− 4	27.7	0.65	5.0
Hanover	58	−11	22.3	0.39	2.5
Harrison	60	−15	21.8	0.67	5.3
Horton	57	−12	21.2	0.31	3.5
Hoxie	67	−14	30.7	1.10	11.0
Hutchinson	64	−15	27.2	1.42	13.0
Independence	63	− 2	28.7	0.64	5.0
Jetmore	68	−13	31.0	0.15	1.0
Lakin	72	− 8	33.2	0.33	4.0
Lawrence	55	− 8	23.6	0.61	5.0
Lebanon	62	−11	23.0	0.50	5.0
Lebo	62	− 6	22.6	1.26	10.5
Leoti	70	−11	33.6	0.02	0.2
Little River	63	−15	26.2	0.19	1.9
Macksville	63	−16	28.0	0.12	1.2
McPherson	62	−12	26.4	0.50	5.0
Madison	61	− 6	24.0	1.20	.....
Manhattan	61	− 8	21.7	0.48	4.9
Marion	59	− 8	24.9	0.60	6.0
Medicine Lodge	72	− 9	32.6	0.23	2.3
Minneapolis	62	−14	24.0	0.22	2.2
Moran	60	− 8	24.8	3.50	15.0
Mounthope *1	60	− 7	28.2	0.82	5.0
Ness City	68	− 9	32.5	0.42	3.5
Newton	63	− 9	27.3	0.95	9.5
Norwich	68	−10	29.9	0.42	4.0
Olathe	56	− 9	23.0	1.30	13.0
Osage City	60	− 9	23.0	0.79	9.0
Oswego	64	− 2	29.8	1.12	4.2
Ottawa	58	− 9	22.4	1.77	11.5
Phillipsburg	64	−11	23.8	0.47	.....
Pratt	67	−13	29.1	0.15	1.5
Rome	70	− 7	31.2	0.84	9.0
Salina	60	−14	24.2	0.46	4.5
Scott	70	−14	29.0	0.30	3.0
Sedan	66	− 4	28.8	0.78	6.0
Seneca	57	−12	22.2	0.40	3.0
Toronto	64	− 7	23.1	1.82	11.0
Ulysses	72	−11	33.0	0.50	5.0
Valley Falls	54	−10	21.5	0.28	2.9
Viroqua	72	−13	36.2	0.20	2.0
Wakeeney (near)				0.37	3.8
Wallace *1	62	− 8	32.5	0.58	5.5
Wamego *1	57	− 8	21.9	0.66	6.6
Winfield	62	− 4	29.8	1.67	8.5
Yates Center	62	− 6	25.0	2.43	17.5
Kentucky.					
Alpha	59	8	31.9	2.34	7.2
Anchorage	56	2	24.8	.....	.....
Bardstown	59	2	27.6	2.00	1.5
Berea	59	3	27.8	1.19	1.2
Blandville	55	6	27.0	2.00	6.0
Bowling Green	60	7	30.8	1.39	2.0
Burnside	61	8	29.5	1.33	1.8
Carrollton	54	− 2	25.2	0.46	T.
Catlettsburg	60	6	28.0	2.16	T.
Centertown	65	4	28.4	0.59	T.
Earlington	59	− 2	27.5	1.09	0.4
Edmonton	60	6	30.8	1.40	5.5
Eubank	58	4	27.8	1.49	2.0
Falmouth				0.64	2.0
Frankfort	56	4	26.0	0.81	3.0
Franklin	60	10	30.4	0.98	7.0
Georgetown	56	3	26.3	.....	.....
Greensburg	62	7	29.2	0.60	1.2
Henderson	56	5	27.4	0.67	0.5
Hopkinsville	61	5	29.6	1.74	5.0
Irvington	55	0	25.6	0.54	0.4
Litchfield	59	1	26.8	0.89	1.2
Loretto	60	2	27.2	1.48	T.
Manchester	64	4	30.7	1.64	8.0
Marrowbone	60	2	29.7	0.73	4.0
Maysville	60	3	24.8	0.70	4.0
Mount Sterling	57	4	25.8	1.38	2.0
Owensboro	59	6	28.8	0.88	0.3
Owenton	50	0	23.0	3.00	2.5
Paducah *a*				1.63	4.0
Paducah *b*	59	8	30.8	1.80	2.5
Kentucky—Cont'd.					
Pikeville	63	8	31.0	3.60	5.5
St. John	56	0	26.0	0.85	0.7
Scott	54	− 3	23.0	0.63	2.9
Shelby City	58	3	27.0	0.67	1.5
Shelbyville	58	2	26.0	0.76	2.8
Warfield	69	4	30.4	3.37	3.2
Williamsburg	59	9	31.6	.....	.....
Louisiana.					
Abbeville	74	30	49.5	1.75	
Alexandria	74	24	45.1	4.06	
Amite	75	25	47.5	5.17	
Baton Rouge	72	31	48.5	3.95	
Calhoun	69	19	41.2	2.48	
Cameron	73	31	51.2	2.78	
Cheneyville	75	21	46.2	4.10	
Clinton	73	25	47.0	4.20	
Collinston	75	29	44.0	3.05	T.
Covington	76	27	49.2	4.89	
Donaldsonville	80	29	49.9	3.80	
Emilie	72	30	49.1	3.19	
Franklin	75	28	49.5	2.17	
Grand Coteau	73	28	47.9	3.47	
Hammond	74	26	49.4	4.21	
Houma	79	28	51.0	2.70	
Jeanerette	74	27	51.4	2.37	
Jennings	76	26	48.0	1.32	T.
Lafayette	74	28	48.0	4.06	
Lake Charles	74	31	48.8	2.87	
Lake Providence	72	19	44.4	2.91	
Lakeside	74	31	49.0	2.99	
Lawrence	78	31	49.7	5.85	
Libertyhill	73	20	46.0	2.67	
Mansfield	71	21	44.0	3.67	1.2
Melville	76	22	46.6	3.30	
Minden	71	21	45.2	3.91	T.
Monroe	72	22	44.4	2.96	
New Iberia	74	.....	.....	2.90	
Opelousas	77	26	46.1	3.00	
Oxford	70[4]	29[4]	45.8[4]	3.57	
Paincourtville	72	29	48.3	3.17	
Plain Dealing	69	19	42.7	2.60	T.
Rayne	75	29	48.8	4.27	
Reserve	74	31	51.0	5.13	
Ruddock	76	28	48.0	4.12	
Ruston	.....	.....	.....	2.68	0.5
Schriever	78	27	49.6	3.59	
Southern University	.....	.....	.....	5.46	
Sugar Ex. Station	77	31	48.7	2.92	
Sugartown	72	29	48.8	4.26	
Venice	.....	33	.....	8.24	
Wallace	81	29	51.2	3.21	
Maine.					
Bar Harbor	55	0	25.7	3.83	21.0
Belfast	49	− 2	22.9	2.59	20.5
Bemis	40	−11	16.0	1.58	15.0
Calais	47	−17	21.4	3.33	23.0
Carmel	55	−12	20.8	2.42	21.0
Cornish	61	− 1	23.4	2.61	14.2
Fairfield	58	−11	21.6	1.54	14.2
Farmington	59	−13	20.8	2.32	22.5
Gardiner	53	− 1	23.8	1.70	8.5
Kineo	40	−14	15.2	3.60	18.0
Lewiston	59	− 2	24.0	3.01	15.5
Mayfield	59	− 3	24.0	3.60	27.0
North Bridgton	65	−10	23.2	2.55	18.0
Orono	52	−15	21.6	1.80	18.0
Rumford Falls	50	−16	18.7	2.19	14.0
Winslow	57	− 8	21.6	1.49	14.0
Maryland.					
Annapolis	56	15	30.5	5.75	4.0
Bachmans Valley	55	0	24.2	6.14	1.0
Boettcherville	57	− 3	24.5	3.45	5.0
Boonsboro	60	3	26.8	4.89	7.0
Cambridge	63	6	31.0	5.64	8.5
Charlotte Hall	61	1	29.1	.....	3.5
Chase	56	− 5	26.2	4.35	.....
Cheltenham	60	− 2	29.0	4.92	1.7
Chestertown	58	8	28.3	5.76	6.5
Chewsville	60	− 2	26.1	4.44	4.5
Clearspring	55	5	24.6	2.97	6.0
Coleman	60	9	28.6	4.22	4.0
Collegepark	59	− 3	27.8	4.45	.....
Colora	.....	.....	.....	6.25	6.0
Cumberland *b*				2.55	4.0
Darlington	56	2	27.3	5.44	.....
Deerpark	57	−15	19.9	4.18	29.0
Denton	61	2	29.0	3.56	9.0
Easton	68	8	29.4	4.91	5.0
Fallston	56	3[e]	25.6	5.53	3.3
Frederick	59	0	27.9	4.49	2.2
Grantsville	55	−10	19.8	3.83	19.0
Greatfalls	58	1	26.7	3.62	.....
Greenspring Furnace	61	0	27.4	3.86	4.0
Guard	59	−10	23.9	2.48	14.5
Hancock	58	− 4	26.0	3.69	5.5
Harney	.....	.....	.....	4.31	.....
Jewell	57	5	29.1	5.05	2.0
Johns Hopkins Hospital	55	10	28.6	3.98	3.0
Maryland—Cont'd.					
Laurel	57	− 5	27.6	6.41	2.0
McDonogh	52	2	26.0	4.29	0.7
Mount St. Marys College	53	6	25.8	4.47	4.5
Newmarket	56	3	26.8	5.45	T.
Pocomoke	60	12	32.8	4.79	5.0
Princess Anne	62	3	30.8	5.59	10.0
Queenstown	62	2	28.0	5.27	8.8
Rockhall *b*	60	2	29.0	4.09	2.0
Sharpsburg	62	− 6	26.6	4.07	2.0
Smithsburg *b*	57	2	25.2	5.52	5.0
Solomons	55	14	30.4	4.63	8.1
Sudlersville	60	5	29.0	6.85	6.5
Sunnyside	57	−17	19.8	4.82	25.0
Takoma Park	57	3	26.5	4.22	.....
Taneytown	57	5	26.5	2.97	1.8
Van Bibber	56	6	29.0	5.18	.....
Westernport	58	0	23.0	3.49	7.0
Woodstock	60	6	29.2	5.26	2.0
Massachusetts.					
Amherst	46	6	25.6	3.32	9.5
Bedford	48	4	25.9	4.04	25.0
Bluehill (summit)	49	7	26.0	5.73	22.5
Cambridge	52	9	28.0	4.76	.....
Chestnuthill	52	8	27.8	7.76	18.0
Cohasset	.....	.....	.....	5.76	.....
Concord	50	1	25.6	3.12	21.3
East Templeton *	56	3	22.9	2.31	12.0
Fallriver	51	12	29.4	5.82	28.8
Fitchburg *a* *1	53	6	24.8	3.20	15.0
Fitchburg *b*	55	5	25.6	2.85	17.0
Framingham	50	0	25.0	6.65	.....
Groton	52	5	25.0	3.99	23.0
Hyannis	.....	.....	.....	4.17	11.5
Lawrence	52	− 1	26.0	3.06	17.8
Leominster	.....	.....	.....	4.08	17.4
Lowell *a*	55	− 1	27.0	6.16	.....
Lowell *b*	55	0	26.0	.....	.....
Ludlow Center	.....	.....	.....	2.70	8.0
Middleboro	51	2	26.8	7.10	19.6
Monson	54	5	25.1	3.26	18.0
New Bedford *a*	46	10	28.6	5.78	29.1
Plymouth *1	47	11	27.9	5.47	15.2
Princeton	.....	.....	.....	4.20	12.5
Provincetown	45	15	28.8	3.62	3.8
Salem	.....	.....	.....	6.77	.....
Somerset *1	53	6	28.0	6.03	23.0
Springfield Armory	56	9	26.6	4.00	16.5
Sterling	.....	.....	.....	4.72	16.0
Taunton	49	2	26.5	6.77	.....
Webster	.....	.....	.....	2.97	25.5
Westboro	51	6	27.6	5.23	20.0
Weston	51	2	26.3	5.56	19.5
Williamstown	48	0	21.6	2.45	18.0
Winchendon	.....	.....	.....	3.14	16.5
Worcester	56	7	26.0	2.62	17.3
Michigan.					
Adrian	53	− 7	20.3	0.70	3.8
Agricultural College	52	−12	18.6	0.44	4.1
Allegan	48[e]	−12[e]	19.7[e]	1.50	12.0
Alma	52	− 5	20.8	1.21	3.0
Ann Arbor	54	− 7	20.1	1.21	11.5
Annpere	54	−10	20.7	0.50	3.0
Arbela	54	−10	21.3	0.52	5.0
Baldwin	49	−21	17.6	0.90	7.0
Ball Mountain	53	− 6	20.6	0.69	5.1
Baraga	52	−15	19.8	1.10	6.0
Battlecreek	50	− 6	21.0	0.52	3.6
Bay City	.....	− 2	.....	0.43	3.5
Benzonia	48	2	21.5	2.30	21.3
Berlin	55[d]	− 7[e]	19.3[e]	0.55	5.0
Berrien Springs	49	−10	19.8	3.20	27.0
Big Rapids	52	−11	18.0	0.95	3.5
Birmingham	55	− 6	21.4	0.62	6.2
Boon	48	−12	16.0	1.28	8.3
Calumet	47	− 4	20.6	1.97	24.0
Carsonville	41	− 5	17.5	0.99	7.2
Cassopolis	49	−10	19.1	1.40	8.0
Charlevoix	45	− 8	21.7	1.55	13.5
Charlotte	51	− 7	20.6	0.40	4.0
Chatham	49	−10	18.4	3.12	26.2
Cheboygan	51	− 5	20.6	0.60	1.0
Clinton	54	− 8	21.0	0.61	5.0
Coldwater	50	− 8	20.2	0.58	4.0
Deerpark	44	− 8	21.2	4.15	38.5
Detour	45	− 6	18.6	2.10	11.0
Dundee	54	− 7	21.2	0.90	4.5
East Tawas	48	− 4	19.4	0.64	1.2
Eloise	55	− 8	20.7	0.68	6.5
Ewen	48	− 5	21.8	1.30	13.0
Fairview	50	− 7	19.4	0.95	9.5
Fennville	49	− 4	20.8	2.50	17.0
Fitchburg	49	−13	19.7	0.48	4.0
Flint	55	− 6	20.1	0.52	4.5
Frankfort	.....	− 5	.....	1.05	6.5
Gaylord	50	− 3	21.2	0.70	7.0
Grand Rapids	53	− 2	22.7	2.40	11.0
Grape	55	− 7	21.2	0.68	5.1
Grayling	49	−12	16.0	0.85	6.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hanover	50	−10	19.6	0.93	8.0
Harbor Beach	50	− 5	20.4	0.55	4.5
Harrison	48	− 5	19.2	0.83	1.5
Harrisville	50	− 5	20.5	0.95	7.2
Hart	48	− 8	20.4	3.05	21.0
Hastings	51	−10	20.6	0.77	5.0
Hayes	55	− 9	19.2	0.20	2.0
Hillsdale	49	− 9	19.1	0.69	4.0
Humboldt	42	−26	15.3	0.85	3.5
Ionia	52[d]	− 7[d]	20.0[d]	0.60	5.0
Iron Mountain	45	−11	17.9	0.88	0.5
Ishpeming	48	−10	17.4	1.10	11.0
Ivan	48	−10	18.4	1.70	14.0
Jackson	57	− 6	21.6	0.80	6.5
Jeddo	55	− 6	20.6	0.86	7.4
Kalamazoo	49	− 4	23.2	0.81	6.0
Lake City	48	−11	15.3	1.60	11.0
Lansing	52	− 5	20.9	0.50	3.3
Lapeer	49	− 6	20.7	.....	.....
Lathrop	45	−11	17.5	2.65	19.5
Lincoln	51[d]	−11	20.8	0.24	2.0
Ludington	49	− 3	21.9	1.16	9.6
Mackinac Island	47	− 4	20.0	0.67	3.0
Mackinaw	46	− 8	19.1	0.57	3.0
Mancelona	49	−20	18.5	2.05	19.0
Manistee	48	− 5	21.3	1.80	15.5
Manistique	44	− 3	20.0	1.85	6.0
Menominee	46	− 9	19.1	1.00	T.
Midland	53	− 6	21.0	0.32	3.0
Mio	50	−13	19.6	1.97	4.5
Mount Clemens	54	− 5	18.5	0.35	T.
Mount Pleasant	50	.....	.....	0.50	3.0
Muskegon	47	−11	19.8	1.18	11.0
Newberry[d]	44	−15	18.[illegible]	1.00	10.0
North Marshall	48	− 9	20.0	0.55	5.0
Olivet	44	− 6	20.1	0.43	2.8
Omer	50	− 8	20.3	0.15	1.5
Onaway	51	−10	19.4	T.	T.
Ontonagon	49	−14	18.0	2.46	12.0
Ovid	50	− 4	20.4	0.21	1.5
Owosso	55	− 4	20.6	0.40	4.0
Petoskey	52	− 5	19.8	1.20	11.0
Plymouth	.....	− 2	.....	0.80	8.0
Pontiac	54	− 6	20.4	0.68	6.0
Port Austin	50	− 6	21.4	0.60	5.0
Reed City	50	−11	17.3	1.55	8.0
Roscommon	.....	.....	.....	0.70	3.0
Saginaw	54	− 3	22.6	0.56	5.6
St. Ignace	46	− 6	19.8	0.22	2.2
St. Johns	51	− 5	22.4	0.22	1.7
St. Joseph	58	− 2	21.6	1.77	12.5
Sidnaw	45	−11	16.7	0.70	7.0
Somerset[e]	48	− 9	20.0	0.50	4.0
South Haven	49	− 2	22.6	1.25	7.5
Thomaston	47	−15	14.6	0.60	5.0
Thornville	51	− 2	21.0	1.10	10.0
Traverse City	52	− 6	21.7	1.80	16.0
Vassar	44	− 6	18.4	0.91	7.9
Wasepi	50	− 8	18.8	0.76	5.0
Waverly	50	−12	19.8	1.33	9.0
Webberville	50	− 6	18.5	0.47	2.7
Wetmore	55	.....	.....	1.85	16.0
Whitecloud	50	−12	19.4	1.70	7.0
Whitefish Point	44	− 6	18.6	2.40	16.0
Ypsilanti	54	− 9	20.5	0.84	6.9
Minnesota.					
Ada	49	−25	10.6	0.67	4.0
Albert Lea	53	−14	13.8	0.23	1.0
Alexandria	51	−22	15.4	0.11	6.5
Ashby	48	−22	15.0	0.85	4.5
Beardsley	55	−23	17.2	1.05	1.5
Beaulieu	49[d]	−26[f]	15.7[e]	0.05	0.1
Bemidji	.....	−22	.....	0.67	5.5
Bird Island	53	−20	16.6	0.82	1.2
Blooming Prairie	49	−16	13.6	0.97	1.7
Brainerd	48	−21	14.6	0.36	3.6
Caledonia	49	−15	14.6	1.24	2.8
Collegeville	48	−16	18.0	0.34	1.9
Crookston	50	−20	13.2	0.73	2.3
Currie	54	−16	15.4[e]	.....	.....
Deephaven	.....	.....	.....	0.65	2.0
Detroit City	48	−29	12.2	0.84	3.0
Faribault	54	−17	15.0	0.67	4.4
Farmington	53	−18	16.2	1.70	5.5
Fergus Falls	49	−24	15.0	0.60	4.0
Glencoe	50	−18	17.8	0.23	2.3
Grand Meadow	47	−17	14.4	1.05	5.3
Hallock	46	−28	11.2	0.65	4.5
Hovland	.....	.....	.....	0.96	7.5
Lakeside	49	−22	16.9	0.45	3.5
Lake Winnibigoshish	48	−22	13.5	0.37	2.8
Leech	50	−21	13.8	0.60	3.9
Long Prairie	51	−24	14.2	0.45	1.8
Luverne	52	−18	17.8	0.25	2.5
Lynd	53	.....	.....	0.90	9.0
Mapleplain	50	−20	16.2	0.79	4.6
Milan	59	−22	17.5	0.80	5.0
Minneapolis[b,i]	50[e]	−17	16.5	0.53	2.1
Minnesota—Cont'd.					
Montevideo	53	−20	16.3	0.66	5.5
Morris	60	−21	16.3	0.50	2.0
Mount Iron	48	−25	14.7	0.20	2.0
New London	55	−20	17.0	0.30	2.0
New Richland	52	−17	16.8	0.55	3.0
New Ulm	53[d]	−17	15.4	1.10	4.8
Park Rapids	44	−24	13.7	0.62	4.8
Pine River	50	−22	13.4	1.30	3.0
Pipestone	50	−21	16.8	0.27	0.5
Pleasant Mounds	53	−20	17.9	0.55	1.5
Pokegama Falls	50	−37	11.0	0.62	0.9
Redwing *a*	.....	.....	.....	0.69	.....
Redwing *b*	50	−15	14.9	0.37	1.5
Reeds	.....	.....	.....	0.43	1.9
St. Charles	48	−14	15.9	1.20	1.0
St. Cloud	51	−20	17.6	T.	T.
St. Peter	54	−15	17.2	0.96	3.5
Sandy Lake Dam	47	−27	13.3	0.31	2.3
Shakopee	57	−17	16.4	1.07	3.0
Tower	47	−41	6.0	0.20	2.0
Two Harbors	44	−22	15.7	1.35	5.0
Wabasha	49	−15	16.2	0.67	2.2
Warroad	.....	.....	.....	0.40	4.0
Willmar	54	−22	18.5[e]	1.05	3.0
Willow River	45	−24	14.2	0.35	1.6
Winnebago City	54	−18	16.0	0.55	2.2
Winona	49	−11	16.4	0.83	2.2
Worthington	43	−17	16.6	0.70	5.6
Zumbrota[1]	50[e]	−20	16.0	.....	.....
Mississippi.					
Aberdeen	64	15	37.6	3.42	T.
Agricultural College	65	17	38.8	5.68	
Austin	69	15	36.1	2.11	T.
Batesville	77	12	37.0	2.65	
Bay St. Louis	71	28	50.0	5.47	
Biloxi	68	28	49.5	6.48	
Booneville	62	16	34.1	2.86	T.
Brookhaven	73	21	46.5	4.35	
Canton	69	21	42.6	2.30	T.
Columbus *b*	65	18	38.2	5.29	
Corinth	.....	15	.....	2.91	
Crystalsprings	73	22	43.1	3.03	T.
Duck Hill	71	18	39.8	2.88	
Fayette	71	24	43.9	4.25	
Fayette (near)[e]	72	26	46.7	3.48	T.
Greenville *a*	66	21	40.7	3.07	
Greenville *b*	70	20	39.8	2.75	
Greenwood	72	.....	.....	2.91	
Hattiesburg	72	25	45.4	4.22	
Hazlehurst	71	22	43.8	4.20	
Hernando	67	15	32.5	1.95	
Holly Springs	62	15	33.1	2.03	T.
Indianola	69	20	39.8	2.28	
Jackson	73	.....	.....	3.35	
Lake	67	19	40.3	3.30	
Laurel	72	19	45.8	4.93	
Leakesville	74	19	46.8	3.87	
Louisville	67	16	40.0	4.44	T.
Macon	70	20	40.8	5.76	
Magnolia	73	22	45.6	5.44	
Natchez	74	25	45.6	2.80	
Nittayuma	69	21	40.7	2.97	
Okolona	65	16	36.4	3.64	T.
Palo Alto	66	16	39.4	3.18	T.
Pearlington	75	25	49.8	3.94	
Pittsboro	68	15	38.4	3.04	
Pontotoc	65	15	36.4	2.53	
Poplarville	.....	.....	.....	4.59	
Port Gibson	74	23	45.8	2.92	
Shoccoe	69	22	43.4	0.86	T.
Stonington[e]	76	26	44.4	3.48	
Suffolk	72	21	44.8	4.18	
Swartwout	74	25	50.2	7.00	
Thornton	70	26	43.6	4.08	
Tupelo	.....	.....	.....	3.64	
University	67	15	36.8	3.20	0.1
Walnutgrove	.....	.....	.....	3.88	
Watervalley	70	17	38.1	2.74	T.
Waynesboro	74	24	47.6	5.15	1.0
Woodville	71	25	46.0	3.45	
Yazoo City	71	22	41.4	2.42	1.0
Missouri.					
Appleton City	58	− 8	23.6	2.06	9.4
Arthur	57	−11	23.2	3.02	13.0
Avalon	58	− 9	22.4	1.00	1.0
Bethany	57	−15	19.0	0.33	1.2
Birchtree	54	− 3	27.4	.....	.....
Boonville	.....	.....	.....	1.03	2.2
Brunswick	58	− 9	21.4	1.33	2.5
Carrollton	.....	.....	.....	0.90	3.0
Conception	56	−15	19.3	0.15	1.5
Cowgill[e,h]	52	−12	21.6	1.05	2.0
Darksville	57	− 7	21.6	0.90	3.5
Dean	60	0	30.4	1.25	8.5
Desoto	58	− 6	26.6	1.01	2.0
Downing	.....	.....	.....	0.48	1.0
Edgehill[e,h]	52	− 4	26.6	1.31	4.0
Eightmile[e,h]	.....	− 4	20.9	2.74	13.0
Missouri—Cont'd.					
Eldon	57	−14	22.6	1.79	10.0
Fairport	.....	.....	.....	0.67	1.6
Fayette	59	−11	22.0	1.23	5.0
Fulton	59	−17	23.1	0.95	4.0
Galena	.....	.....	.....	2.71	15.2
Gallatin[e,i]	64	− 8	24.1	.....	.....
Gayoso	72	9	31.6	2.89	9.5
Glasgow	58	− 7	21.6	1.85	5.0
Gorin	.....	.....	.....	0.57	1.1
Halfway	55	− 5	25.8	2.49	10.5
Harrisonville	56	− 9	19.6	1.86	8.3
Hazlehurst	.....	.....	.....	1.00	2.0
Hermann	.....	.....	.....	1.08	1.3
Houston	55	− 1	23.7	2.08	11.0
Ironton	58	− 6	26.4	1.25	5.5
Jackson	60	1	27.5	2.20	6.5
Jefferson City	65	−13	23.1	0.73	2.0
Joplin	61	− 1	29.8	1.98	6.2
Kidder	60	−12	21.2	0.72	1.0
Koshkonong	56	5	28.8	2.31	10.0
Lamar	63	− 3	28.4	2.32	13.0
Lamonte	.....	.....	.....	3.12	5.0
Lebanon	53	− 4	25.4	2.00	9.5
Lexington	61	− 8	24.4	1.36	2.0
Liberty	57	− 8	22.0	0.75	3.5
Louisiana	52	−15	22.4	1.57	1.0
McCune[e,i]	54	− 7	21.4	2.14	1.8
Macon	53	− 7	21.7	0.96	3.5
Marblehill	56	1	27.6	1.41	5.6
Marshall	60	− 8	22.5	2.00	1.1
Maryville	55	−11	18.6	0.91	2.5
Mexico	61	−11	22.2	0.69	3.0
Miami[e,h]	57	− 7	22.1	1.80	2.4
Mineralspring	56	0	29.2	1.15	11.0
Monroe City	50	− 9	20.8	0.83	1.2
Montreal	54	−17	23.6	1.48	8.0
Mountaingrove	55	− 2	26.2	2.55	10.9
Mount Vernon	60	− 2	29.5	3.17	14.0
Neosho	60	− 4	29.6	2.11	11.0
Nevada	.....	.....	.....	2.89	13.5
New Haven	60	− 7	25.8	1.83	4.0
New Madrid *b*	.....	.....	.....	2.11	.....
New Palestine	57	−15	23.8	0.91	1.0
Oakfield	57	− 5	25.2	1.40	2.3
Olden	48[e]	3	26.9	2.75	8.0
Oregon	58	−12	22.0	0.44	3.3
Palmyra[e,h]	52	− 6	22.6	0.68	1.2
Phillipsburg[e]	53	− 4	26.6	1.37	9.9
Pine Hill	.....	.....	.....	1.75	5.5
Poplarbluff	58	6	29.5	2.00	6.8
Potosi	55	− 9	24.1	2.60	13.9
Princeton	54	−11	20.8	1.02	3.0
Richmond	57	− 8	22.7	1.22	2.5
Rockport	.....	.....	.....	0.27	2.0
Rolla	.....	.....	.....	1.31	8.1
St. Charles	56	− 6	23.8	0.90	1.8
St. Joseph	.....	.....	.....	0.14	1.0
Sarcoxie[e,i]	.....	− 3	24.4	1.36	7.0
Sedalia	58	− 8	23.6	3.01	8.0
Seymour	52	−11	25.5	2.44	13.2
Sikeston	56	0	27.9	1.62	8.0
Steffenville	53	−10	20.8	0.95	3.0
Sublett	50	−12	19.8	0.70	3.5
Trenton	52	− 8	21.2	0.82	2.2
Unionville	58	−10	21.8	1.15	2.5
Vichy	56	−11	24.0	1.20	5.4
Warrensburg	59	− 7	23.2	2.62	5.0
Warrenton	58	− 8	21.2	1.64	1.5
Wheatland	.....	.....	.....	2.52	15.2
Willowsprings	59	− 5	27.6	2.84	8.3
Windsor	58	−10	22.6	.....	.....
Zeitonia	61	.....	.....	2.82	7.0
Montana.					
Adel	54	−30	28.6	0.35	3.5
Anaconda	58	−19	29.6	0.75	7.5
Augusta	58	−20	26.6	0.49	8.2
Big Timber	60	−15	30.4	0.75	7.5
Boulder	49	−19	26.2	0.51	5.3
Bozeman	54	−14	28.8	0.66	.....
Butte	50	−18	30.1	1.00	10.1
Canyon Ferry	54	−19	27.8	1.58	11.0
Chester	47	−23	14.0	0.50	5.0
Columbia Falls	55	0	28.6	.....	.....
Crow Agency	60	−15	27.8	0.74	5.0
Culbertson	47	−32	10.8	1.08	8.5
Deerlodge	52	−28	28.4	.....	.....
Dillon	58	−24	31.6	0.45	3.4
Fort Benton	48	−10	21.4	0.60	6.0
Fort Logan	47	−20	23.2	0.05	0.5
Glasgow	44	−30	13.5	1.40	.....
Glendive	54	−22	17.3	1.60	16.0
Greatfalls	60	−16	27.5	1.02	9.8
Lewiston	.....	−15	.....	1.30	8.0
Livingston	58	− 1	33.1	0.29	0.9
Manhattan	61	−15	30.8	0.44	4.0
Marysville	66	−15	27.8	1.05	10.5
Ovando	45	−38	20.8	2.44	24.7
Parrot	57	−14	31.2	0.39	0.8

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Plains	54	− 8	31.2	1.10	11.0
Poplar	45	− 22	13.1	1.58	14.0
Ridgelawn	48	− 31	13.8	0.88	7.5
St. Pauls	57	−14	23.0	0.64	4.2
St. Peter	54	− 27	28.4	0.38	5.5
Springbrook	55	−19	18.2	1.03	6.6
Townsend	59	−16	29.4	0.43	.....
Troy	54	− 9	32.5	2.69	1.5
Twin Bridges	65e	− 6e	29.8e	0.80	.....
Twodot	55	−15	26.1	1.40	14.0
Utica	59	− 8	28.1	0.24	5.0
Wibaux	48	−30	12.2	0.25	2.5
Yale	58	−19	25.4	1.00	10.0
Nebraska.					
Agate	.....	.....	.....	0.34	3.5
Agee *1	56	−21	18.4	0.68	4.8
Albion	60	−20	23.2	0.60	3.0
Alliance	64	−20	24.6	0.50	5.0
Alma	63	−18	24.8	0.54	5.4
Ames	.....	.....	.....	T.	T.
Ansley	65	−20	24.5	0.57	4.2
Arapahoe	.....	.....	.....	0.35	3.5
Arborville *1	56	−16	22.2	0.35	2.0
Arcadia	.....	.....	.....	0.55	5.5
Ashland *a*	60	−15	21.8	0.02	0.5
Ashland *b* *1	52	−14	22.2	T.	T.
Ashton	.....	.....	.....	0.43	4.0
Auburn	59	−13	21.8	0.09	0.5
Aurora	56	−14	22.0	0.87	4.2
Bartley	.....	.....	.....	0.35	3.5
Beatrice	59	−18	21.0	0.14	0.5
Beaver	64	−16	26.4	0.35	3.5
Bellevue	.....	.....	.....	0.08	2.9
Benedict	.....	.....	.....	0.54	0.5
Benkleman	.....	.....	.....	0.38	7.5
Blair	57	−13	18.4	0.09	1.4
Bluehill	.....	.....	.....	0.60	4.5
Bradshaw	.....	.....	.....	0.38	2.0
Bridgeport	64	−23	30.6	0.50	4.5
Brokenbow	63	−22	24.4	0.32	2.1
Burchard	.....	.....	.....	T.	T.
Burwell	.....	.....	.....	0.35	3.5
Callaway	62	−12	23.8	0.35	4.0
Central City	.....	.....	.....	0.50	0.5
Chester	.....	.....	.....	0.35	3.5
Cody	.....	.....	.....	T.	T.
Columbus	58	−14	22.4	0.14	T.
Crete	60	−15	22.0	0.27	1.3
Culbertson	.....	.....	.....	0.25	2.5
Curtis	58e	− 9e	27.6e	0.60	6.0
David City	57	−15	21.1	0.35	1.0
Dawson	59	−14	22.5	T.	T.
Eden	.....	.....	.....	0.05	0.5
Edgar *b	60	−12	24.0	0.44	4.4
Ericson	.....	.....	.....	0.90	3.0
Ewing	.....	.....	.....	0.50	5.0
Fairbury	62	−18	23.4	0.27	3.0
Fairmont	58	−16	20.0	0.42	4.5
Fort Robinson	59	−18	27.2	0.65	5.0
Fremont	58	−16	21.0	0.08	.....
Fullerton	.....	.....	.....	0.39	1.0
Geneva	59	−15	20.8	0.63	4.0
Genoa	60	−15	22.2	0.40	2.0
Gering	60	−21	28.4	0.74	4.4
Gothenburg	58	−18	24.8	0.85	8.5
Grand Island *a*	.....	.....	.....	0.27	2.5
Grand Island *b*	59	−18	22.2	0.48	3.5
Grand Island *c*	57	−15	22.9	0.57	.....
Greeley	.....	.....	.....	0.30	2.5
Guide Rock	.....	.....	.....	0.90	7.5
Haigler	.....	.....	.....	0.10	1.0
Hartington	56	−17	17.6	0.84	4.0
Harvard	60	−14	21.7	0.65	4.2
Hastings *1	60	−11	23.5	0.59	7.5
Hayes Center	.....	.....	.....	0.46	4.6
Hay Springs	59	−18	23.8	2.01	19.7
Hebron	61	−16	22.4	0.33	2.8
Hickman	.....	.....	.....	0.15	1.5
Holbrook	.....	.....	.....	0.35	3.5
Holdrege	60	−12	24.8	0.20	2.0
Hooper *1	51	−10	28.0e	0.12	0.7
Johnstown	.....	.....	.....	0.22	3.6
Kearney	59	−14	21.9	0.60	7.8
Kimball	59	−15	30.6	0.75	7.5
Kirkwood *1	59	−19	18.8	0.32	2.2
Laclede	60	−17	22.2	0.74	3.0
Lexington	58	−21	23.8	0.80	8.0
Lodgepole	58e	−16e	26.6e	0.30	3.0
Loup	57	−23	22.4	0.45	5.5
Lynch	61	−24	22.4	0.80	3.0
Lyons	.....	.....	.....	0.34	0.9
McCook *1	60	−11	29.4	0.20	2.0
McCool	.....	.....	.....	0.15	.....
Madison	57	−14	21.6	0.50	1.5
Madrid	60	− 8	26.0	0.30	3.0
Marquette	.....	.....	.....	0.74	4.0
Mason City	.....	.....	.....	0.40	4.0
Minden *a*	59	−15	20.8	0.56	6.3
Monroe	.....	.....	.....	0.42	1.5
Nebraska City *b*	.....	.....	.....	0.05	0.5
Nemaha	.....	.....	.....	0.10	1.0
Nesbit	62	−20	24.2	0.49	4.5
Norfolk	56	−21	20.5	0.41	3.5
North Loup	56	−21	22.6	0.55	5.7
Oakdale	57	−20	19.9	0.25	2.0
Odell	.....	.....	.....	0.75	3.0
O'Neill	57	−24	20.0	0.40	2.0
Ord	.....	.....	.....	0.28	0.5
Osceola	.....	.....	.....	0.11	0.3
Palmer	.....	.....	.....	0.20	2.0
Palmyra *1	60	−16	21.0	0.30	T.
Plattsmouth *b*	57	−12	20.8	0.20	2.0
Ravenna *a*	55	−18	21.8	0.70	6.2
Ravenna *b*	.....	.....	.....	0.56	4.8
Redcloud *b*	64	−16	24.3	0.70	7.0
Republican *1	60	−16	25.5	0.52	5.2
Rulo	.....	.....	.....	0.10	1.0
St. Libory	.....	.....	.....	0.50	5.0
St. Paul	59	−19	23.2	0.49	3.3
Salem *1	56	−10	21.6	T.	T.
Santee	60	−19	20.6	0.67	5.3
Schuyler	.....	.....	.....	0.25	.....
Seneca *1	58	−10	23.8	0.32	3.2
Seward	56	−15	21.4	0.02	0.2
Smithfield	.....	.....	.....	0.55	5.5
Spragg	.....	.....	.....	0.20	2.0
Stanton	58	−21	20.8	0.24	1.3
State Farm	60	−14	22.6	0.09	.....
Strang	.....	.....	.....	0.20	2.0
Stratton	.....	.....	.....	0.38	.....
Superior	58	−14	20.3	0.80	7.0
Syracuse	.....	.....	.....	0.10	1.0
Tecumseh *b*	53	−13	18.3	0.11	0.8
Tecumseh *c*	.....	.....	.....	0.11	0.8
Tekamah	56	−12	20.0	0.10	0.0
Turlington	57	−16	21.2	0.12	1.2
Wakefield	56	−18	19.0	0.36	1.9
Wallace	.....	.....	.....	0.65	6.5
Wauneta	.....	.....	.....	0.35	3.5
Weeping Water	.....	.....	.....	0.24	1.7
Westpoint	60	−16	24.7	0.19	0.7
Wilber *1	60	−12	22.7	0.22	2.2
Willard	.....	.....	.....	0.55	2.7
Winnebago	.....	.....	.....	0.25	2.5
Wisner	.....	.....	.....	0.20	1.5
Wymore	.....	.....	.....	0.45	2.0
York	60	−12	24.2	0.30	1.0
Nevada.					
Amos	65	1	36.8	1.34	2.0
Austin	58	12	35.1	1.10	.....
Battle Mountain *	68	7	35.0	0.68	3.0
Beowawe *1	67	5	40.7	1.00	7.0
Candelaria *	72	21	41.4	.....	.....
Carlin *1	55	8	36.3	1.10	6.0
Carson City	67	13	40.6	2.98	10.6
Cranes Ranch	.....	.....	.....	1.83	5.7
Elko (near)	56	−16	34.9	4.21	23.5
Ely	60	2	33.5	0.65	6.5
Fenelon *1	59	0	32.6	0.69	7.0
Golconda *1	65	16	40.8	1.46	2.0
Halleck *1	56	−13	33.3	0.99	7.8
Hamilton	54	10	30.6	3.47	34.8
Hot Springs *5	68	12	42.2	.....	.....
Humboldt	66	12	39.6	0.34	.....
Lee	.....	.....	.....	2.98	19.0
Lewers Ranch	66	18	41.4	7.19	31.0
Lovelocks *a* *1	68	10	36.0	1.00	0.0
Lovelocks *b*	75	12	41.5	0.39	0.0
Martins	69	13	41.8	1.84	0.0
Mill City *1	62	13	41.2	0.55	0.2
Monitor Mill	55	4	32.3	0.46	6.3
Owyhee	57	− 9	35.4	1.10	1.8
Palisade *1	61	2	33.4	2.98	13.0
Palmetto	62	3	35.4	1.10	11.0
Potts	60	10	38.0	0.57	7.0
Reno State University	62	10	39.6	1.40	4.2
Silverpeak	64	12	38.2	.....	.....
Sodaville	70	12	41.6	0.34	.....
Tecoma *1	60	0	35.3	0.50	T.
Toano *5	58	0	33.3	0.45	4.5
Tybo	59	9	33.2	0.90	11.0
Wabuska	71	8	41.1	0.23	1.0
Wadsworth	68	15	41.8	0.97	.....
Wells *1	51	4	33.7	0.80	8.0
Wood	56	3	33.8	1.88	.....
New Hampshire.					
Alstead	51	− 2	22.0	2.10	12.0
Berlin Mills	55	−23	16.6	2.16	21.0
Bethlehem	54	− 4	19.8	2.14	22.0
Brookline *1	52	− 2	24.9	3.30	21.0
Chatham	63	− 8	21.0	2.50	9.0
Concord	56	− 1	23.2	2.37	12.6
Durham	53	6	25.2	4.33	10.5
Franklin Falls	56	− 2	22.3	2.11	12.0
Grafton	58e	−18e	18.7e	1.74	10.0
Hanover	57	− 9	20.0	2.00	9.9
Keene	58	− 6	23.2	2.32	10.8
Littleton	54	− 2	21.8	3.02	28.0
Nashua	55	− 3	24.6	4.27	17.2
Newton	52	5	25.6	5.29	14.0
Peterboro	64	− 4	22.5	3.69	13.5
Plymouth	53	−10	20.9	1.83	11.8
Sanbornton	62	− 2	22.0	1.78	13.0
Stratford	57	−16	17.6	1.00	15.0
New Jersey.					
Asbury Park	51	9	28.3	6.29	14.8
Bayonne	55	9	27.8	5.79	18.2
Belvidere	56	0	26.4	7.05	19.5
Bergen Point	54	8	27.4	6.15	21.4
Beverly	58	6	28.6	4.85	12.9
Blairstown	52	− 1	24.3	.....	14.0
Bridgeton	59	7	29.6	6.27	12.5
Camden	62	11	28.8	5.83	12.0
Cape May C. H.	54	8	29.5	5.55	14.0
Charlotteburg	58	2	24.6	6.85	13.0
Chester	54	0	24.0	5.31	18.6
Clayton	59	7	27.6	6.25	24.0
College Farm	54	6	27.2	6.46	17.0
Dover	49	2	24.5	6.93	18.0
Egg Harbor City	56	7	28.0	5.45	6.5
Elizabeth	54	7	28.5	7.83	23.0
Englewood	57	9	28.8	6.13	20.0
Flemington	52	5	27.4	5.34	13.5
Freehold	53	8	27.0	.....	.....
Friesburg	59	5	27.6	5.35	11.1
Hanover	55	3	25.8	8.44	20.5
Hightstown	55	9	27.7	6.56	18.0
Imlaystown	56	8	28.0	6.19	17.5
Indian Mills	57	1	28.4	6.40	17.5
Lakewood	56	7	28.4	5.97	16.2
Lambertville	55	6	27.4	5.66	13.5
Layton	55	− 7	22.8	4.29	19.2
Moorestown	57	9	28.0	6.45	13.6
Mount Pleasant	.....	.....	.....	4.37	21.5
Newark	54	9	27.1	5.35	15.4
New Brunswick	55	8	28.2	6.92	15.5
New Egypt	.....	.....	.....	6.33	20.0
Newton	56	− 2	24.0	6.33	23.0
Oceanic	54	8	27.8	6.42	10.5
Paterson	59	12	29.9	8.15	25.5
Plainfield	54	7	27.3	7.65	23.2
Rancocas	.....	.....	.....	5.46	12.9
Ringwood	59	− 1	26.1	6.70	20.7
Rivervale	56	2	27.2	7.53	21.0
Roseland	57	2	25.4	6.90	15.2
Salem	60	9	29.2	6.87	9.6
Somerville	56	6	28.0	5.77	14.5
South Orange	52	6	26.8	5.69	18.5
Sussex	55	0	24.8	5.30	22.0
Three Bridges	.....	.....	.....	7.25	16.0
Trenton	58	10	30.2	5.94	11.4
Tuckerton	54	8	28.7	5.02	15.0
Vineland	59	7	28.4	7.37	18.5
Woodbine	54	6	28.2	6.45	15.0
Woodstown	.....	.....	.....	6.43	12.0
New Mexico.					
Alamagordo	70	18	45.7	0.16	
Albert	75	10	44.6	0.00	
Albuquerque	69	12	41.2	T.	
Alma	77	14	43.2	0.65	
Arabela	77b	17	45.0d	0.40	1.0
Aztec	65	8	35.6	0.31	1.3
Bellranch	.....	.....	.....	T.	T.
Bluewater	58	− 7	30.8	0.30	3.0
Cambray	.....	.....	.....	0.04	
Carlsbad	92	16	53.0	0.00	
Cloudcroft	52	7	28.6	0.50	5.0
Deming	.....	.....	.....	T.	T.
East Lasvegas	61	11	38.0	T.	
Engle	73	17	43.7	0.00	
Folsom	64	0	34.3	0.80	9.5
Fort Bayard	80	21	44.6	0.35	T.
Fort Stanton	72	10	38.5	0.38	3.2
Fort Union	75	3	37.8	T.	T.
Fort Wingate	60	6	35.7	0.59	5.9
Gage	.....	.....	.....	0.30	
Galisteo	58	9	34.4	0.05	0.5
Gallinas Spring	69	8	41.4	0.08	
Horse Springs	67	10	37.3	0.24	2.8
Las Vegas	69	3	37.6	0.10	T.
Lordsburg	.....	.....	.....	0.10	
Los Lunas	66	10	37.6	0.00	
Lower Penasco	76	17	45.1	0.00	
Mesilla Park	78	16	46.5	T.	
Olio	64	4	35.2	T.	
Raton	67	3	36.6	0.80	8.0
Roswell	82	12	45.4	0.00	
San Marcial	.....	.....	.....	T.	
Socorro	70	18	43.5	0.06	
Strauss	.....	.....	.....	T.	
Taos	60	0	32.7	0.15	3.0
Winsors Ranch	57d	0	30.8	0.52	5.2
Woodbury	68	11	39.4	0.35	T.

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
New York.	°	°	°	*Ins.*	*Ins.*
Adams				7.44	88.0
Addison	54	−10	22.4	1.42	7.0
Adirondack Lodge	50	−12	15.0	4.61	43.6
Akron				1.71	
Alden	55	— 4	20.6	2.18	17.8
Angelica	58	−18	18.9	1.80	12.5
Appleton	52	0	22.5	0.83	
Athens				4.52	23.0
Atlanta	50	−11	19.3	1.94	13.5
Auburn	54	0	22.4	2.07	16.5
Avon	57	— 7	19.8	1.22	13.5
Axton	56	−26	14.8	3.45	50.5
Baldwinsville	47	— 9	22.0	3.69	31.2
Bedford	54	5	25.4	5.95	23.5
Blue Mountain Lake				2.20	22.0
Bolivar	50	−19	18.0	1.99	14.3
Bouckville	53	— 7	20.0	4.61	44.0
Boyds Corners				6.81	29.2
Brockport	50	— 1	20.3	1.46	14.0
Caldwell	49	— 7	20.1	2.78	16.0
Canaan Four Corners	51	— 1	20.7	2.21	21.0
Canajoharie	54	−13	22.0	2.84	28.9
Canton	55	−11	15.1	2.85	22.0
Carmel	54	3	24.4	5.13	25.5
Carvers Falls	52	−12	17.1	1.40	
Catskill	50	2	25.2	4.88	19.0
Cedarhill	52	0	23.8	2.71	9.0
Cooperstown	46	−12	18.6	2.89	27.0
Cortland	48	−10	23.6	1.35	5.9
Cutchogue	50	12	28.4	5.81	17.5
Dekalb Junction				2.17	31.0
Easton				2.32	18.0
Elba	46	— 2	18.6	2.60	21.0
Elmira	49	1	23.2	1.46	4.0
Fayetteville	52	— 4	22.3	3.26	29.5
Franklinville	50	−16	17.6	2.45	16.8
Gabriels	52	— 8	17.0	2.87	36.0
Gansevoort				3.60	17.0
Glens Falls	50	— 2	22.8	2.63	8.7
Gloversville	48	−11	18.8	3.13	34.0
Greenwich	54	— 4	22.2	1.40	10.0
Griffin Corners	57	— 9	21.0	2.53	18.5
Haskinville				1.26	9.4
Hemlock	52	— 5	21.0	2.15	22.0
Honeymead Brook	52	3	24.4	3.54	16.7
Humphrey	47	— 8	17.8	3.53	23.0
Indian Lake	56	−21	17.2	2.38	23.0
Ithaca	50	— 1	21.4	1.41	6.4
Jamestown	54	−10	20.2	1.89	13.4
Keene Valley	52	−17	19.2	3.50	35.0
King Ferry				1.99	14.0
Littlefalls, City Res	54	— 7	19.3	2.99	20.5
Lowville	48	−10	18.2	3.41	31.2
Lyndonville				1.39	
Lyons	52	2	23.6	2.49	22.5
Mayle				1.99	17.0
Meredith	47	— 5	17.7	3.04	20.0
Middletown	48	5	22.8	4.91	33.0
Mohonk Lake	48	2	22.3	4.32	27.0
Moira	50	— 4	16.8	2.80	28.0
Newark Valley				2.04	10.0
New Lisbon	53	−18	18.0	2.81	18.2
North Hammond				2.20	19.5
North Lake	68	−25	15.8	4.55	41.0
Number Four	53	−17	17.2	5.81	53.5
Nunda	56	— 5	21.8	1.60	8.0
Ogdensburg	55	— 1	20.0	0.96	9.2
Old Chatham				4.64	27.2
Oneonta	57	— 9	22.0	2.97	24.6
Oxford	51	−12	20.5	4.02	34.5
Palermo				1.93	
Penn Yan	53	— 4	22.0	0.78	5.2
Perry City	49	−10	19.8	1.46	8.8
Plattsburg Barracks	48	−10	18.6	1.60	16.0
Port Byron				2.90	28.0
Port Jervis	55	0	24.5	6.46	25.5
Primrose	52	5	27.2	6.38	16.0
Redhook				3.92	7.0
Richmondville	53	— 5	20.6	3.11	26.0
Ridgeway	49	1	20.8	2.62	22.8
Rome	44	−11	21.0	3.83	33.0
Romulus	50	1	21.9	1.53	11.0
Salisbury Mills				8.24	
Saranac Lake	54	−14	17.5	2.91	34.7
Saratoga Springs	51	— 4	22.4	3.86	10.0
Setauket	54	14	28.2	5.47	13.5
Shortsville	53	— 1	21.4	1.35	11.0
Skaneateles				2.44	
Southampton	48	11	28.0	5.40	14.5
South Canisteo	55	−11	20.6	2.37	12.0
Southeast Reservoir				3.63	15.2
South Kortright	53	−11	19.8	3.56	29.3
South Schroon	52	−10	19.5	2.87	24.5
Straits Corners	45	— 9	19.1	2.20	12.5
Ticonderoga	54	— 5	22.4	2.05	17.5
Volusia	55	— 6	19.6	3.17	
Walton	51	— 9	20.8	5.76	26.0
Wappingers Falls	52	— 6	23.9	4.93	29.5
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Warwick				6.81	
Watertown	50	— 3	20.5	2.70	42.0
Waverly	49	— 3	22.4	2.20	11.1
Wedgwood	45	— 3	19.7	2.02	14.5
Wells	55	−25	19.2	2.02	19.2
West Berne	64	— 8	22.4	5.60	33.5
West Chazy	45	−14	18.0		
Westfield *b*	53	— 3	20.4	1.44	
Westfield *c*	48	— 1	20.8	0.73	5.0
Windham	54	−10	20.0	3.88	27.8
Wolcott				2.60	19.0
North Carolina.					
Abshers	65	9	34.0	5.27	4.0
Asheville				6.86	8.4
Brevard	64	8	33.6		
Bryson City				6.29	15.3
Chapelhill	70	15	34.2	6.92	16.0
Cherryville	63	10	35.2	6.75	12.0
Currituck				4.67	4.0
Edenton	68	18	37.9	6.35	10.0
Fayetteville	73	16	39.0		
Goldsboro	76	19	37.9	5.72	10.0
Greensboro	65	15	34.0	4.95	9.0
Henderson	67	15	34.2	6.80	14.0
Hendersonville	62	9	32.6	8.75	14.0
Henrietta	64	14	36.5	8.19	13.5
Highlands	54	3	27.2	5.66	15.5
Horse Cove	58	9	33.4	10.26	14.0
Hot Springs	63	11	37.6		8.2
Kinston	76	19	38.4	6.70	11.0
Lenoir	67	9	33.7	6.66	7.0
Linville	54	0	26.4	8.90	6.0
Littleton	70	12	33.8	6.61	12.0
Louisburg	70	7	35.2	6.57	24.0
Lumberton	69	22	38.4	5.92	2.0
Marion	64	9	35.0	7.80	9.5
Marshall	61[d]	8[d]	33.3[d]	6.28	13.0
Mocksville	65	9	33.0	3.96	10.0
Moncure	71	7	36.6	6.98	15.0
Monroe	68	11	34.9	6.81	11.0
Morganton	65	12	35.4	6.65	10.5
Mountairy	66	13	34.7	3.01	4.0
Murphy				6.17	10.5
Oakridge	70	12	36.8	5.91	9.5
Patterson *	62	13	33.2	6.16	8.4
Penelo	71	12	36.6	6.70	12.4
Reidsville	68	14	34.4	4.54	7.8
Rockingham	70	17	36.6	6.47	11.0
Roxboro	66	13	33.9	6.51	9.0
Salisbury	72[e]	15[e]	36.5[e]	5.98	10.5
Saxon	65	8	33.0	3.98	7.0
Selma	71	12	36.4	7.10	14.0
Settle	64	13	35.6	5.45	7.5
Sloan	71	17	38.5	5.38	1.2
Soapstone Mount	68	4	33.4	5.80	16.5
Southern Pines *a*	71	15	39.4	5.64	11.0
Southern Pines *b*	67	17	37.8	5.17	11.5
Southport	68	21	43.3	5.01	T.
Springhope *	70	17	39.6	6.99	12.5
Statesville	66	9	33.8	5.21	11.3
Tarboro	72	19	37.5	7.23	10.0
Washington	71	21	40.8	5.11	9.5
Waynesville	62	6	31.8	7.99	13.0
Weldon *a*	66	19	33.4	5.21	
North Dakota.					
Amenia	46	−23	13.6	0.32	2.5
Ashley	45[e]	−30	9.6	0.65	5.0
Berlin	47	−28	11.6	1.15	11.0
Buxton	46	−21	14.0	0.38	1.1
Cando	42	−26	8.8	0.72	5.0
Churchs Ferry	45	−25	9.8	0.76	3.6
Coalharbor	44	−30	13.0	2.95	19.5
Devils Lake	50	−25	14.6	0.52	4.0
Dickinson	45	−31	11.8	1.43	9.5
Donnybrook				3.60	35.0
Dunseith	36	−33	8.8	1.54	7.5
Edgeley	49	−23	14.8	0.51	2.5
Ellendale	55	−24	16.4	0.22	0.2
Falconer	49	−30	15.2	1.20	7.0
Fargo	49	−16[e]	14.6[e]	0.34	2.2
Forman	49	−25	14.6	0.37	T.
Fort Yates	56	−29	14.8	0.73	6.1
Fullerton	49	−25	13.2	0.68	5.7
Gallatin	44	−30	11.4	0.29	2.6
Glenullin	47	−23	14.2	0.66	5.6
Grafton	48	−18	13.2	0.57	1.7
Hamilton	45	−19	12.5	0.40	1.6
Hannaford	43	−25	11.2	0.47	3.3
Jamestown	42	−25	10.1	0.80	5.2
Larimore	50	−23	10.8	0.63	2.5
McKinney	41	−33	8.0	0.51	3.8
Mayville	46	−20	12.3	0.50	5.0
Medora	53	−27	17.0	0.70	7.0
Melville	44	−25	13.0	0.53	1.5
Milton	45	−28	10.1	0.98	9.8
Minot	44	−24	11.0	1.70	17.0
Minto	50	−22	11.4	0.58	1.3
Napoleon	42	−30	10.7	0.55	4.0
North Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Oakdale	52	−21	17.0	1.46	13.0
Portal	36	−33	7.4	1.45	14.5
Power	56	−23	15.0	0.66	2.6
University	50	−19	14.2	0.59	3.9
Valley City	42	−28	7.6		
Wahpeton	53	−19	18.6	1.39	2.4
Willow City	40	−26	8.7	1.55	13.0
Woodbridge	42	−25	10.0	3.37	29.7
Ohio.					
Akron	59	— 7	21.5	1.15	10.0
Annapolis	60	— 6	20.9	1.08	3.0
Atwater				0.94	4.5
Bangorville	60	−11	21.0	1.80	9.0
Bellefontaine	54	— 8	21.4	0.70	7.0
Bement				0.53	6.0
Benton Ridge	58	— 8	21.8	0.77	7.1
Binola				0.73	13.8
Bladensburg	58	— 9	22.0	0.66	6.4
Bloomingburg	55	— 6	22.2	0.98	7.5
Bowling Green	56	— 8	20.7	0.57	5.2
Cambridge	66	— 7	24.9	1.15	3.0
Camp Dennison	55	— 3	23.2	0.43	2.3
Canaan				1.01	11.4
Canal Dover	60	−10	22.4	1.18	5.5
Canton	58	— 5	22.2	1.46	8.9
Cardington	57	−13	20.6	0.86	8.8
Cedarville				1.35	4.6
Circleville	57	— 3	23.6	0.64	2.0
Clarksville	55	— 5	22.7	0.41	2.0
Cleveland *a*	61	— 5	22.7	0.96	8.5
Cleveland *b*	60	— 4	22.0	0.59	6.6
Clifton	54	— 7	21.8	0.65	3.0
Coalton	59	— 5	24.6	0.79	2.3
Colebrook	53	−13	18.5	0.90	4.0
Dayton *a*				0.35	3.0
Dayton *b*	57	— 8	22.2	0.61	3.6
Defiance	59	— 9	21.0	0.72	4.1
Delaware	58	— 7	21.2	0.75	4.3
Demos	59	— 3	23.2	1.15	4.9
Dunham				2.02	2.2
Elyria	60	— 7	21.4	0.52	4.2
Findlay	60	— 8	22.2	0.65	6.5
Frankfort	57	— 4	23.0	0.20	1.0
Fremont	58	— 6	22.4	0.65	6.9
Garrettsville	59	−13	20.8	1.20	8.7
Granville	57	— 5	22.5	0.71	4.3
Gratiot	56	— 5	22.4	0.93	5.4
Green	59	3	26.2	1.09	2.0
Greenfield	56	— 1	23.8	0.45	2.5
Greenhill	60	−12	20.2	1.09	6.3
Greenville	65	— 7	23.1	0.44	0.8
Hanging Rock	66	5	27.6	1.95	1.2
Hedges	57	−10	20.6	0.72	4.3
Hillhouse	57	−10	18.9	1.24	2.4
Hiram	58	−11	19.4	0.72	11.0
Hudson	59	−10	20.6	1.37	9.5
Jacksonboro	55	— 6	22.8	0.45	3.0
Killbuck	57	— 7	22.8	1.08	6.0
Lancaster	58	— 4	23.6	0.81	3.0
Lima	57	— 9	20.6	1.16	10.0
Logan	59	1	24.8		
McConnellsville	62	— 3	24.4	1.85	4.8
Manara	56	— 5	22.4	0.32	1.0
Mansfield				1.10	8.5
Marietta	62	4	27.2	2.61	2.0
Marion	61	— 9	21.9	0.90	8.3
Medina	58	−12	20.4	0.93	12.0
Milfordton	55	— 9	18.6	1.15	8.5
Milligan	60	— 8	23.0	1.15	4.0
Millport	59	−12	21.9	1.44	9.1
Montpelier	51	−10	19.8	0.86	6.5
Mooresfield	61	— 5	23.6	1.50	4.0
Napoleon	60	— 7	22.8	0.84	2.0
New Alexandria	62	— 3	23.6	2.15	4.5
New Berlin	57	— 8	21.2	0.93	6.0
New Bremen	56	−10	21.0	0.58	5.5
New Lexington				0.64	2.5
New Paris	56	— 8	21.6	0.55	2.0
New Richmond	55	— 1	23.7	0.31	1.6
New Waterford	58	— 9	21.8	1.84	12.0
North Lewisburg	58	−10	21.3	0.85	6.0
North Royalton	57	— 7	21.6	0.46	10.5
Norwalk	59	— 7	21.6	0.60	5.5
Oberlin	60	— 6	22.4	1.51	7.2
Ohio State University	57	— 6	21.4	0.56	3.7
Orangeville	57	−17	19.6	0.90	5.0
Ottawa	58	−10	20.5	0.37	T.
Pataskala	58	— 8	21.3	0.66	3.6
Philo	60	— 3	23.7	0.80	2.0
Plattsburg	53	−10	20.5	0.80	5.0
Pomeroy	65	3	26.4	0.87	T.
Portsmouth *a*				1.20	T.
Portsmouth *b*	62	3	28.0	1.30	1.2
Pulse				0.61	3.5
Red Lion				0.10	
Richfield				0.58	0.8
Richwood	60	— 8	21.6	0.66	4.0
Ripley	55	0	23.5	0.47	2.3

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Rittman	57	— 7	22.0	0.58	6.0
Rock				1.59	6.5
Rockyridge	58	— 9	22.2	0.23	0.5
Shenandoah	55	—10	20.8	0.61	5.3
Sidney	57	— 7	22.4	0.62	5.7
Somerset	56	— 4	23.8	1.16	1.2
Springfield				0.65	2.6
Strongsville				0.90	5.0
Swanton				0.65	1.2
Tiffin	57	— 5	22.1	1.00	9.2
Upper Sandusky	58	— 7	22.0	0.95	9.5
Urbana	53	— 7	21.2	0.55	3.2
Vickery	59	— 6	21.2	0.17	1.9
Walnut				0.49	4.2
Warren	63	— 7	20.2	1.71	15.2
Warsaw	68	— 8	22.4	0.81	4.0
Wauseon	54	—10	21.4	1.18	5.9
Waverly	59	— 1	25.7	0.71	1.7
Waynesville	56	— 6	22.3	0.57	3.0
Wellington	58	— 7	21.9	0.78	11.0
Westerville	59[b]	— 6[c]	22.2[c]	0.55	5.5
Willoughby				1.73	9.5
Wooster	59	— 9	21.4	0.83	6.0
Zanesville				1.07	6.8
Oklahoma.					
Arapaho	74	— 9	34.7	0.02	T.
Beaver	74	— 8	34.8	0.00	
Blackburn	70	— 2	33.5	1.06	2.6
Burnett	72	12	38.8	0.28	2.0
Chandler	70	5	37.7	0.28	2.8
Clifton	72	6	36.3	0.08	0.8
Cloud Chief	72	0	34.8	0.02	
Fort Reno	76[c]	3	35.4[c]	0.03	T.
Fort Sill	76	7	41.2	T.	
Guthrie	72	2	34.8	0.32	1.0
Hennessey	82	1	36.0	0.11	T.
Jefferson	75	— 6	33.3	0.10	1.0
Jenkins	76	— 4	33.6	0.32	2.5
Kenton	71	— 4	38.4	0.40	1.0
Kingfisher	76	2	36.4	T.	T.
Lyons	75	— 1	35.6	0.15	0.4
Mangum	77	10	41.4	T.	
Newkirk	68	1	33.6	0.60	6.0
Norman	73	5	36.1	0.28	1.5
Pawhuska	66	—10	32.1	1.15	11.5
Perry	72	0	34.2	0.22	0.5
Shawnee	72	6	37.6	0.43	3.0
Stillwater	70	2	36.2	0.17	1.0
Taloga	78	2	35.8	0.08	0.8
Waukomis	75	0	35.0	0.10	T.
Weatherford	78	2	38.2	T.	
Oregon.					
Albany *a*[1]	68	32	46.6	6.77	
Albany *b*				8.90	
Alpha	68	32	46.8	19.55	
Arlington		11		3.41	
Ashland *b*	69	23	44.8	5.30	3.0
Aurora[1]	63	32	47.2	6.39	
Aurora (near)	66	27	45.2	7.17	0.4
Bay City	66	34	47.2	21.53	
Bend	62	3	37.0	2.05	7.1
Beulah	57	— 2	34.2	3.82	13.0
Blackbutte	70	30	47.2	13.00	
Blalock	64	14	38.6	3.61	6.0
Brownsville[1]	62	36	49.6	8.10	
Bullrun	53	30	40.2	10.04	
Burns	57	— 1	34.8	3.31	
Cascade Locks	56	21	39.2	12.73	8.0
Comstock[1]	74	34	46.8	10.99	
Coquille				13.15	
Corvallis	68	30	45.6	10.29	
Dayville	64	10	41.8	2.75	0.5
Detroit	62	29	39.9	13.41	4.0
Ella				2.24	
Eugene	74	32	46.8	8.34	
Fairview	70	32	47.2	14.65	
Falls City	64	30	44.0	21.16	
Forestgrove	63	26	44.8	14.29	
Gardiner	75	32	49.2	16.44	
Glenora	61	29	41.5	23.60	1.0
Government Camp	55	15	34.4	6.85	31.0
Grants Pass	75	30	45.4	12.83	
Hare	66	34	46.7	26.36	
Heppner	68	5	40.4	1.48	
Hood River (near)	58	15	37.7	7.09	18.8
Huntington	64	1	38.8	3.54	
Jacksonville	76	27	44.2	9.63	0.5
Joseph	54	—14	30.5	1.02	9.8
Junction City[1]	74	32	49.3	8.22	
Kerby	71	28	45.4	29.75	T.
Klamath Falls	61	21	37.8	2.50	3.0
Lafayette[1]	62	30	46.7	8.55	
Lagrande	56	— 7	37.0	1.90	2.0
Lakeview	57	6	35.2	3.32	13.2
Lonerock	62	1	37.0	1.62	T.
McKenzie Bridge	69	24	41.9	11.64	
McMinnville	66	29	45.4	10.52	
Merlin[1]	72	32	46.7	14.36	
Oregon—Cont'd.					
Monmouth *a*	66	31	44.2	8.97	
Monroe	70	31	46.2	12.43	
Mount Angel	67	29	46.0	7.54	
Nehalem				20.23	
Newberg	65	28	45.8	9.56	
Newport	72	36	48.9	13.10	
Pendleton	76	7	42.2	2.14	
Pine	53			4.18	3.0
Placer				16.54	
Prineville	73	10	41.0	1.00	10.0
Riddles[1]	74	34	47.6	8.80	
Riverside				2.43	T.
Salem *b*	67	30	46.2	8.10	
Sheridan[1]	60	33	45.8	9.55	
Silverlake	58	16	37.0	1.45	4.4
Silverton[1]	68	32	46.9	7.63	
Siskiyou[1]	57	28	39.4	9.05	51.0
Smock	63	9	35.4	3.91	10.3
Sparta	53	9	33.2	5.00	28.0
Springfield[1]	71	32	45.8	7.36	
Stafford	69	25	45.0	9.50	
The Dalles	58	16	38.5	3.79	7.0
Toledo	70	32	48.5	14.21	
Umatilla				2.10	
Vale	60	— 6	35.2	2.50	3.5
Westfork[1]	68	34	48.2	14.80	
Weston	63	— 1	37.9	3.02	3.0
Williams	73	28	45.6	11.50	T.
Pennsylvania.					
Aleppo	64	— 3	24.9	2.24	7.0
Altoona	53	— 2	21.6	2.60	
Bellefonte	55	— 3	24.8	3.06	16.0
Brookville				2.65	13.0
California	60	— 1	26.4	1.52	3.3
Cassandra	53	— 4	21.1	4.75	40.0
Clarion				1.98	11.7
Coatesville	58	5	27.9	6.92	7.9
Confluence				2.70	14.6
Davis Island Dam				0.45	
Derry Station	54	0	23.9	3.38	21.2
Doylestown				7.43	
Drifton[f]	46	0	24.1	3.70	15.0
Driftwood				1.20	3.0
Duncannon				6.63	8.2
Dushore	52	— 7	20.7	4.45	24.6
Dyberry	52	—13	19.8	5.23	32.5
East Bloomsburg				5.24	20.8
East Mauch Chunk	53	— 3	25.2	7.16	9.3
Easton	52	5	26.4	5.80	12.2
Ellwood Junction				1.35	7.0
Emporium	54	— 8	22.7	3.23	12.9
Ephrata	56	— 2	25.8	5.73	8.0
Everett	55	0	22.0	2.12	3.5
Forks of Neshaminy[1]	54	4	27.2	5.19	
Franklin	59	—14	21.7	1.59	8.0
Freeport				1.25	3.0
Girardville				6.45	24.5
Grampian	53	—10	20.0	1.84	11.0
Greensboro				1.55	2.0
Hamburg				6.44	9.5
Hamlinton	46	— 2	19.8	6.82	34.0
Hawthorn[f]	61	—16	19.8	1.93	4.5
Herrs Island Dam				1.53	0.5
Huntingdon *a*	56	— 1	25.4	2.98	8.5
Huntingdon *b*				2.08	10.1
Irwin				1.50	
Johnstown	61	— 2	25.0	2.48	9.8
Karthaus				3.33	20.0
Kennett Square	58	5[f]	28.4[d]	6.18	7.5
Lancaster	58	3	25.4	6.45	6.8
Lansdale				6.92	
Lawrenceville	55	—10	21.2	1.95	4.0
Lebanon	54	0	26.2	5.67	11.4
Leroy	50	— 5	20.4	3.02	14.7
Lewisburg	52	— 5	24.0	4.41	22.5
Lockhaven *a*	56	0	25.4	3.59	21.8
Lockhaven *b*				2.10	11.6
Lock No. 4				1.39	6.0
Lycippus	54	— 2	21.9	2.74	16.2
Mifflin				3.35	11.5
Oil City				1.63	16.4
Ottsville				5.21	
Parker				1.50	11.1
Philadelphia	58	13	30.0	5.61	13.0
Pocono Lake	52	—12	19.4	4.91	11.0
Point Pleasant				6.32	
Pottstown	56	11	29.4	6.00	6.0
Pottsville				5.64	
Quakertown	53	1	26.3	5.05	11.5
Reading[g]			25.7	6.72	
Renovo *a*				1.65	0.9
Saegerstown	56	—24	19.4	1.49	8.7
St Marys	46	— 5	19.4	4.10	33.0
Saltsburg				1.75	7.0
Seisholtzville				6.49	
Selinsgrove	56	— 3	24.9	3.23	16.5
Shawmont				5.09	
Smethport	52	—15	20.4	1.80	6.0
Pennsylvania—Cont'd.					
Smiths Corners				4.28	
Somerset	58	—16	16.5	5.65	33.6
South Eaton	54	— 1	24.8	5.26	29.0
State College	52	— 1	20.9	2.92	14.6
Towanda	48	— 1	22.4	3.35	19.0
Troutrun				2.70	15.0
Uniontown	62	4	26.8	2.66	7.1
Warren	50	— 9	22.8	1.57	9.5
Wellsboro	52	— 4	24.6	2.70	7.5
Westchester	57	6	26.9	7.18	9.8
West Newton				2.40	6.0
Westtown	57	7	28.4	5.98	10.0
Wilkesbarre	55	5	25.4	5.60	15.0
Williamsport	53	3	23.4	4.81	23.9
York	56	4	26.5	6.74	15.8
Rhode Island.					
Bristol	48	14	28.7	5.61	22.0
Kingston	52	5	26.0	6.46	31.5
Pawtucket	48	9	28.4	7.49	24.0
Providence *a*	51	12	28.8	6.98	28.5
Providence *c*	48	10	27.1	7.14	23.5
South Carolina.					
Aiken	68	19	42.2	5.80	T.
Allendale	70	25	43.8	3.80	
Anderson	65	13	39.2	9.99	6.2
Barksdale	59	11	36.0	10.51	11.0
Batesburg	71	21	42.8	7.76	T.
Beaufort	68	29	46.4	4.07	T.
Blackville	71	23	42.8	5.96	
Bowman	71	21	43.5	4.75	T.
Calhoun Falls				7.20	3.0
Camden				4.67	4.5
Cheraw *a*	68	18	36.9	5.43	7.0
Cheraw *b*				5.22	5.5
Clemson College	65	15	38.4	9.44	12.0
Conway	77	20	42.2	5.81	T.
Darlington	70	18	40.2	4.94	1.4
Duewest	65	18	39.5	9.44	6.8
Edisto				5.59	0.1
Effingham				6.24	0.5
Florence	71	23	40.4	5.49	
Gaffney	65	16	36.2	7.73	17.0
Georgetown	65			4.65	
Gillisonville	72	22	45.2	3.68	
Greenville	64	12	35.4	9.35	15.2
Greenwood	66	18	37.8	8.14	5.0
Heath Springs	70	24	38.2	6.30	7.0
Kingstree *b*				6.22	T.
Liberty	62	14	38.2	8.04	15.0
Little Mountain	70	18	40.2	4.98	3.0
Longshore	70	17	39.6	5.64	5.0
Lugoff	72	16	39.7	4.89	1.0
Pinopolis[1]	68	26	43.9	5.57	
St. Stephens				4.95	T.
Santuck	71	16	37.6	7.64	9.5
Seivern	70	16	41.2	4.57	T.
Smiths Mills				5.55	T.
Society Hill	69	21	39.7	4.93	4.0
Spartanburg	65	17	37.3	7.88	15.0
Statesburg	72	22	41.9	4.15	0.2
Summerville	72	23	44.4	4.65	T.
Sumter	71	20	43.0	4.16	
Temperance	72	19	41.2	5.50	
Trenton	68	19	41.1	6.39	T.
Trial	74	18	41.6	4.88	
Walhalla	64	12	38.0	7.58	12.1
Winnsboro	70	18	39.9	4.03	5.0
Winthrop College	69	15	37.2	5.10	14.0
Yorkville	68	17	40.0	7.60	15.0
South Dakota.					
Aberdeen	53	—25	12.5	0.15	0.5
Academy	58	—16	19.9	0.48	4.2
Alexandria	57	—21	15.2	1.35	11.0
Armour	60	—20	18.3	1.80	8.0
Ashcroft	62	—25	22.0	0.55	4.0
Bad Nation	61	—29[c]	21.2	0.21	2.5
Bowdle	46	—28	12.0	0.37	3.7
Brookings	55	—22	16.1	0.26	2.3
Canton	54	—25	17.7	0.13	2.7
Centerville				0.78	2.0
Chamberlain	59	—24	19.0	0.35	3.3
Clark	46			0.45	2.0
Desmet	46	—24	16.2	0.22	1.0
Doland	57	—28	16.0	0.44	0.4
Elkpoint	56	—23	19.2	0.96	6.0
Farmingdale				0.10	1.0
Faulkton	50	—22	15.2	0.23	3.7
Flandreau	55	—24	16.6	0.26	2.5
Forestburg	55	—23	15.4	0.51	4.1
Fort Meade	59	—16	22.9	2.30	18.0
Fort Randall	61[c]	—23[c]	19.6[c]	0.47	1.5
Gannvalley	56	—20	17.4	0.80	8.0
Gary	59	—18	19.8	1.06	9.0
Grand River School	48	—27	15.2	0.42	10.0
Greenwood	61	—18	21.2	0.58	2.0
Hartman	53	—23	15.5	0.65	2.5
Hotch City	52	—29	15.8	0.26	
Howard	55	—25	18.4	0.71	2.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Howell	53	−25	15.6	0.22	1.9
Interior	62	−23	23.7	0.23	2.1
Ipswich	50	−23	14.3	0.50	0.5
Kimball	54	−21	16.8	1.04	9.0
Leola	50	−26	12.8	0.47	2.0
Leslie	60	−29	19.6	T.	T.
Marion	55	−22	16.3	0.38	2.7
Mellette	56	−22	17.2	0.08	T.
Menno	58	−18	17.6	0.62	3.2
Millbank	60	−17	17.6	0.30	3.0
Mitchell	52	−30	18.1	0.23	T.
Mound City	45	−28	12.2	0.05	0.5
Oelrichs	65	−12	24.9	1.00	5.0
Pedro	60	−24	21.4	0.22	1.9
Pine Ridge	60	−23	24.6	0.57	2.0
Plankinton	55	−23	16.6	1.04	6.0
Redfield	55	−24	15.3	0.22	1.0
Rochford	60	−16	26.1	1.40	13.0
Rosebud	64	−22	21.6	0.43	4.7
St. Lawrence	50	−21	15.2	0.05	0.5
Silver City				T.	T.
Sioux Falls	52	−22	16.6	0.37	3.5
Sisseton Agency	55	−21	17.7	0.18	1.8
Spearfish	58	− 8	24.9	1.93	14.5
Vermilion	58	−18	19.4	0.55	4.0
Watertown	56	−23	15.3	.....	.....
Waubay	50	−25	14.6	0.10	0.2
Wentworth	55	−22	16.3	0.26	2.6
Wolsey				0.53	4.8
Tennessee.					
Andersonville	60	7	33.3	3.78	6.0
Ashwood	61	8	32.6	2.67	8.0
Benton	64	9	35.4	4.95	7.5
Bluff City				5.05	7.5
Bolivar	61	14	31.4	3.20	T.
Bristol	59	7	30.4	4.94	4.0
Byrdstown	60	7	31.2	1.70	7.2
Carthage	64	11	33.4	2.27	9.6
Charleston				4.79	10.0
Clarksville	59	8	30.2	1.98	8.2
Clinton				3.05	7.0
Decatur	62	9	34.7	4.63	18.5
Dickson	60	4	31.0	3.50	15.0
Elizabethton	66	4	29.7	4.76	7.0
Erasmus	60	5	31.2	3.82	16.2
Florence	61	5	31.4	2.60	10.5
Franklin	65	8	32.4	2.86	9.0
Grace [1]	68	10	34.2	3.50	14.5
Greeneville	60	5	31.2	4.12	7.0
Harriman	60	9	33.7	3.15	11.0
Hohenwald	61	2	31.2	3.00	8.2
Iron City	64	10	34.8	2.17	3.0
Isabella	61	10	33.3	6.72	10.0
Johnsonville	62	2	31.4	2.46	12.0
Jonesboro [1]	59	15	34.3	4.33	4.6
Kingston				4.24	10.5
Lafayette [3]	60	8	30.4	2.60	6.0
Lewisburg	62	3	33.0	3.32	13.1
Liberty	63	4	33.8	2.78	10.4
Lynnville	61	11	32.4	2.25	6.5
McKenzie	60	9	31.2	2.10	12.0
Maryville	60	9	34.2	4.03	12.0
Newport	64	10	33.9	4.75	4.5
Nunnelly	66	5	32.2	1.75	5.5
Palmetto	68	8	33.6	3.16	9.0
Peryear				3.60	.....
Pope	63	5	34.0	2.75	5.5
Rogersville	60	9	31.7	4.29	6.8
Rugby	60	− 1	30.2	4.47	17.0
Savannah	61	16	35.0	2.55	T.
Sewanee	57	5	31.1	4.30	5.0
Silverlake	60	− 1	28.2	5.50	7.2
Tazewell				2.85	7.0
Tellico Plains	62	7	34.8	4.90	14.5
Tracy City	60	8	32.1	4.03	6.9
Trenton	60	5	31.4	3.70	9.0
Tullahoma	63	6	33.0	3.40	5.0
Union City	64	.....	.....	3.15	10.0
Waynesboro	62[a]	9	33.6[a]	3.20	3.0
Wildersville	60	5	33.8	1.68	16.8
Yukon	60	12	34.2	3.68	8.0
Texas.					
Albany	74	12	44.0	0.10	1.0
Alvin				1.91	.....
Anna	77	15	42.8	0.10	1.0
Anson				T.	.....
Arthur				0.76	T.
Austin *a*	80	30	50.3	1.41	T.
Austin *b* [3]	80	21	47.1	.....	.....
Ballinger	80	15	43.7	0.50	4.0
Bastrop	84	28	51.2	.....	.....
Beaumont	76	32	51.0	2.17	
Beeville	88	.....	.....	1.46	
Big Spring				0.02	T.
Blanco				0.80	
Boerne [1]	80	28	50.0	1.02	
Booth				3.23	
Bowie	78	10	44.3	0.35	3.0
Brazoria	79	33	54.0	2.89	
Brenham	79	30	49.8	1.74	0.1
Brighton	83	33	54.7	2.06	
Burnet	91	17	52.2	0.20	
Camp Eagle Pass [c]	87	30	51.8	0.75	
Coleman	83	14	47.0	0.80	4.0
College Station	.....	25	.....	1.10	
Columbia	79	30	53.5	2.58	
Comanche	81°	13°	47.2°	0.50	4.0
Corsicana	79	18	48.2	0.52	0.8
Cotulla	78	32	49.0	0.33	
Cuero	79	31	55.0	1.71	T.
Dallas	79	16	47.4	0.26	1.4
Danevang	81	31	53.5	2.95	
Dublin	79	14	43.0	0.40	2.8
Duval	84	27	51.4	1.15	T.
Estelle	82	16	46.2	0.21	1.2
Fort Brown	90	29	59.8	1.30	
Fort Davis	77	19	48.2	T.	
Fort McIntosh	99	36	55.6	0.40	
Fort Ringgold	104	36	63.3	0.00	
Fredericksburg	79	25	51.2	0.42	
Gainesville	79	13	42.0	0.22	2.0
Georgetown [1]	82	26	49.9	0.94	0.1
Grapevine	82	15	47.0	0.17	1.2
Hale Center	78	10	44.4	T.	T.
Hallettsville	81	32	52.7	2.08	.....
Haskell	84	8	43.6	T.	
Henrietta	78	10	41.1	0.11	1.0
Hewitt	.....	.....	.....	0.53	3.2
Hondo	.....	.....	.....	0.85	
Houston	77	32	51.2	3.86	T.
Huntsville	75	29	48.2	2.52	T.
Ira	81	11°	45.2°	T.	T.
Jacksonville	73	21	48.2	2.13	0.5
Jasper	75	.....	.....	3.11	
Kaufman	76	17	47.4	0.35	0.4
Kent	.....	.....	.....	0.00	
Kopperl	.....	.....	.....	0.25	
Kerrville	84	20	49.2	0.57	T.
Lampasas	84	22	47.6	0.62	T.
Lapara	.....	.....	.....	1.60	
Laureles Ranch	.....	.....	.....	1.79	
Llano [3]	82	26	48.9	0.24	1.4
Longview	70	25	43.8	2.63	2.0
Luling	83	28	52.5	0.74	
Mann	92	20	48.8	0.75	1.0
Menardville	82	16	47.0	0.20	2.0
Mount Blanco	81	6	42.4	T.	
Nacogdoches	73	25	47.0	3.60	T.
New Braunfels	84	29	51.4	0.66	
Panter	.....	.....	.....	0.73	5.5
Port Lavaca	81	35	55.0	1.28	
Rhineland	81	10	44.5	T.	T.
Rockisland	79	30	52.4	2.75	T.
Rockport	70	40	52.4	0.70	
Runge	81	.....	.....	1.58	
Sanderson	74	30	49.0	0.60	
San Marcos	83	30	51.2	1.63	
San Saba	83	20	48.8	0.83	2.4
Santa Gertrudes Ranch	.....	.....	.....	1.60	
Shaeffer Ranch	94	36	58.2	2.96	
Sherman	74	17	41.8	0.56	1.0
Sugarland	80	30	52.1	3.75	T.
Sulphur Springs	72	19	44.6	2.88	T.
Temple *a*	77	22	47.2	0.99	0.6
Temple *b*	77	20	47.4	0.72	0.1
Trinity	75	25	50.0	2.43	T.
Tulia	78	1	38.2	T.	T.
Tyler	72	25	46.6	1.98	.....
Victoria	.....	.....	.....	1.10	
Waco	81	22	49.8	0.65	1.5
Waxahachie	78	17	47.6	0.35	3.5
Weatherford	79	13	44.3	0.16	T.
Weimer	80	31	54.7	1.58	T.
Wichita Falls	.....	.....	.....	0.00	
Utah.					
Aneth	68	4	36.6	0.19	
Blackrock	65	1	35.6	0.20	T.
Bluecreek [1]	55	10	36.4	0.52	
Castledale	61	−11	32.8	0.11	1.1
Cisco	54	2	32.0	1.00	
Corinne	67	− 1	35.2	2.44	6.0
Coyoto	65	3	33.4	0.20	2.0
Deseret	67	− 5	36.2	0.30	
Emery	58	4	31.8	T.	T.
Escalante	60	7	34.5	0.30	
Farmington	58	6	36.1	1.89	8.8
Fillmore	69	2	38.8	1.03	
Fort Duchesne	51	−15	27.0	0.05	T.
Frisco	59	9	36.4	0.02	0.2
Giles	70	− 1	34.7	0.06	
Government Creek	60	2	35.5	1.02	9.6
Green River	.....	.....	.....	0.63	.....
Grover	63	4	34.0	1.00	10.0
Heber	58	− 6	32.8	1.03	2.5
Henefer	59	−10	32.8	1.80	8.7
Hite	72	18	44.1	0.60	
Huntsville	.....	.....	.....	2.41	8.5
Kelton [1]	55	8	33.4	0.30	T.
Lasal	57	2	32.5	1.57	15.7
Levan	56	0	33.6	1.41	6.3
Loa	58	−20	24.8	0.40	4.0
Logan	56	1	34.4	0.95	.....
Lund	65	− 8	34.0	0.05	.....
Manti	61	− 6	33.6	0.90	5.1
Marysvale	65	− 6	33.6	0.78	6.2
Meadowville	51	2	30.9	0.85	7.0
Millville	.....	.....	.....	1.19	.....
Minersville	63	5	36.8	0.29	.....
Moab	69	5	37.1	0.49	T.
Mount Nebo	62	1	36.8	0.60	2.0
Mount Pleasant	62	5	34.8	1.28	.....
Ogden	58	5	36.4	2.39	4.5
Park City	52	− 5	31.0	1.18	13.6
Parowan	62	4	34.6	0.31	3.0
Pinto	63	− 8	33.2	0.95	0.2
Promontory	.....	.....	.....	0.65	T.
Provo	64	− 1	37.0	1.12	1.0
Ranch	57	1	29.1	2.54	.....
Richfield	65	− 4	36.0	0.65	6.5
St. George	74	5	41.6	0.77	
Scipio	64	−15	35.6	1.61	5.0
Snowville	59	− 5	33.6	1.47	
Soldier Summit	53	3	26.0	0.70	7.0
Terrace	.....	.....	.....	T.	
Thistle	70	8	38.1	2.05	13.0
Tooele	60	6	37.3	0.55	.....
Tropic	58	1	28.4	0.49	4.0
Vernal	57	− 3	31.8	0.51	0.8
Virgin	70	4	44.2	1.10	0.0
Wellington	59	−10	29.2	0.29	2.9
Woodruff	52	− 5	29.7	0.50	5.0
Vermont.					
Bennington	54	−11	21.9	2.15	17.5
Burlington	52	2	21.6	1.82	17.5
Chelsea	52	− 6	18.8	1.96	24.0
Cornwall	50	− 6	20.7	2.13	18.5
Enosburg Falls	54	−21	14.2	5.46	48.5
Hartland	52	−10	19.6	1.65	10.5
Jacksonville	54	− 9	20.4	4.16	23.6
Manchester	50	− 5	20.4	1.51	13.8
Norwich	51	−11	19.2	1.00	10.0
St. Johnsbury	53	−15	18.2	1.08	12.0
Wells	50	− 4	20.0	1.55	13.0
Woodstock	50	−16	15.7	2.69	15.0
Virginia.					
Alexandria	59	5	30.0	3.67	1.0
Ashland	65	12	32.6	3.61	6.0
Barboursville	72	11	34.4	4.62	5.5
Bedford	68	12	33.0	5.40	2.5
Bigstone Gap	58	6	31.8	5.01	4.0
Birdsnest [2]	.....	.....	30.6	4.65	1.0
Blacksburg	62	5	27.8	3.40	6.2
Bonair	67	12	32.4	5.02	6.5
Burkes Garden	55	0	25.0	4.85	4.0
Charlottesville	68	1	31.1	4.75	3.8
Columbia	68	5	33.0	6.20	12.0
Dale Enterprise	65	2	27.0	4.62	14.0
Fredericksburg	62	11	31.0	3.91	4.0
Freeling	60	1	32.0	5.67	5.8
Grahams Forge	62[a]	4[a]	27.6[a]	3.85	5.0
Hampton	62	18	35.2	5.55	7.0
Hot Springs	60	3	26.4	5.25	1.0
Lexington	67	9	31.0	4.25	1.5
Lincoln	61	5	27.0	4.33	T.
Newport News	66	18	37.0	5.80	6.0
Petersburg	69	7	34.4	5.67	7.2
Quantico	60	6	30.8	.....	.....
Radford	.....	.....	.....	2.19	5.0
Roanoke	67	11	32.2	7.32	2.5
Salem	.....	.....	.....	4.43	3.0
Shenandoah	.....	.....	.....	3.98	7.4
Speers Ferry	.....	.....	.....	5.71	4.0
Spottsville	65	8	33.8	6.78	16.0
Stanardsville	63	3	27.2	2.20	T.
Staunton	65	9	30.0	4.92	7.5
Stephens City	.....	.....	.....	4.67	4.0
Warsaw	61	7	29.6	6.10	6.0
Westpoint	65	10	32.3	4.50	8.0
Williamsburg	62	12	32.6	5.14	11.5
Woodstock	68	2	27.8	3.35	7.0
Wytheville	62	6	29.1	4.87	5.0
Washington.					
Aberdeen	60	31	42.9	22.41	
Anacortes	.....	.....	.....	2.20	
Ashford	.....	.....	.....	8.32	
Bremerton	62	27	45.0	12.86	
Bridgeport	66	− 3	39.4	.....	.....
Brinnon	61	28	43.5	26.63	
Cedonia	49	− 3	31.3	2.90	16.4
Centralia	64	29	44.0	6.10	
Cheney	.....	.....	.....	2.99	8.0
Clearwater	.....	31	.....	22.46	0.2
Cle Elum	57	5	32.4	4.16	20.0
Colfax	59	6	36.4	3.62	.....

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Colville	52	6	33.5	3.22	15.3
Conconully	57	3	31.8	3.93	17.5
Connell				3.08	
Coupeville	56	26	45.2	2.23	T.
Crescent	51	4	32.9	3.70	11.5
Dayton	71	1	39.3	1.29	.....
East Sound	60	18	44.2	2.79	
Ellensburg	49	— 3	31.1	3.29	22.5
Ellensburg (near)	48	0	32.2	3.25	15.5
Grandmound	58	30	44.6	9.09	
Granite Falls				10.78	T.
Hooper	72	—18	38.0	2.75	1.3
Ilwaco	61	34	46.5	21.66	
Lacenter	63	25	43.4	10.94	
Lakeside	48	11	33.2	3.30	19.0
Lind	60	—12	34.0	2.53	5.5
Loomis	50	— 1	34.4	4.35	8.5
Mayfield	63	28	42.4	7.86	
Mottinger Ranch	72	5	39.9	2.11	
Mount Pleasant	59	22	41.4	10.08	
Moxee Valley	61	2	34.8	2.70	5.5
Northport	46	—13	29.5	5.45	11.2
Olga	58	32	45.6	1.86	
Olympia	59	28	44.8	11.68	
Pasco	74	— 9	38.4	2.16	
Pinehill	56	12	36.6	6.01	14.8
Pomeroy	67	8	39.8	2.80	2.0
Port Townsend	59	29	45.2	3.17	T.
Pullman	54	— 6	35.4	2.49	T.
Rosalia	56	— 6	35.4	2.98	5.6
Sedro	66	25	45.2	4.07	
Silvana	63	18	45.4	5.74	
Snohomish	63	29	44.0	10.40	T.
Snoqualmie	63	26	44.2	8.32	T.
Southbend	62	33	45.6	18.70	
Sprague				4.10	10.0
Stampede				2.55	13.0
Sunnyside	57	2	35.8	1.91	0.8
Union	64	28	43.0	22.08	T.
Usk	44	—13	31.7	2.94	18.5
Vancouver	64	22	43.6	9.14	T.
Vashon	62	26	44.4	9.70	T.
Waterville	47	— 5	29.0	4.33	31.0
Wenatchee (near)	52	4	33.1	3.55	35.8
Whatcom	62	19	45.6	2.42	
Wilbur	50	—17	30.4	3.23	12.0
West Virginia.					
Beckley	55	— 6	26.8	3.17	7.0
Beverly	61	— 7	25.0	3.82	23.0
Bluefield	60	1	26.9	5.15	12.0
Buckhannon	64	—11	23.2	3.39	12.0
Burlington	62	— 1	24.1	4.55	5.0
Byrne	68	2	26.2	5.65	14.5
Central	65	— 3	25.0	2.08	3.8
Charleston				3.77	3.3
Creston				2.08	3.0
Cuba	62	— 1	25.8	2.20	1.5
Dayton	67	— 5	24.6	2.61	3.2
Elkhorn	60	4	29.9	4.17	9.8
Fairmont				2.54	7.8
Foster	65	8	28.3	.....	.....
Glenville	65	— 7	25.6	3.85	7.3
Grafton	65	— 1	25.2	2.38	9.5
Green Sulphur	62	7	29.1	2.82	13.0
Harpers Ferry				2.20	0.9
Hinton *a*				3.64	6.5
Hinton *b*	64	6	29.6	.....	.....
Huntington	61	6	26.6	2.83	.....
Josiah	65	2	27.2	2.22	7.0
Leonard	59	— 2	24.4	2.46	7.0
Lewisburg	61	2	26.2	3.20	3.2
Logan	64	3	31.4	4.25	9.0
Magnolia	62	— 2	26.0	4.53	5.0
Mannington	67	— 4	26.0	1.80	14.5
Martinsburg	56	0	24.3	3.20	4.0
Morgantown	63	1	25.1	2.48	6.0
Moscow	62	— 3	24.0	1.13	4.5
Moundsville	64	0	27.4	1.68	3.7
New Martinsville	65	0	27.8	1.62	5.0
Nuttallburg	62	1	25.7	3.85	8.0
Oceana	61	0	30.0	4.02	.....
Oldfields	65	1	27.8	3.88	.....
Parsons	63	— 3	25.2	1.62	.....
Point Pleasant	67	4	28.2	2.75	1.0
Powellton	64	4	29.7	4.64	13.2
Princeton	55	1	28.2	8.65	14.0
Romney	65	— 1	26.0	4.12	6.0
Rowlesburg				2.69	17.0
Terra Alta	57	— 5	20.6	3.30	25.0
Uppertract	63	— 1	25.8	3.50	5.8
Wellsburg	59	— 2	23.2	2.92	2.3
Weston *a*				2.91	3.7
Weston *b*	67	— 7	26.6	.....	.....
Wheeling *a*				1.33	4.6
Wheeling *b*	66	2	29.2	1.47	3.5
Williamson	66	7	30.4	3.99	5.0
Wisconsin.					
Amherst	45	—15	16.4	1.90	.....
Antigo	46	—16	15.8	0.70	2.0
Appleton	49	—10	18.2	1.54	1.3
Ashland				1.39	.....
Barron	48	—22	13.7	0.26	.....
Beloit	48	— 8	17.4	1.30	.....
Brodhead	51	—12	16.6	1.60	4.5
Butternut	48	—21	13.9	1.65	2.0
Chilton	54	—12	17.0	1.89	0.5
Dodgeville	50	—15	15.0	1.60	2.0
Easton	53	—15	15.4	1.46	1.8
Eau Claire	48	—18	15.0	0.88	1.2
Florence	43	—10	17.4	.....	.....
Fond du Lac	53	—10	19.8	0.33	T.
Grand River Locks				2.12	2.5
Grantsburg	47	—26	14.4	0.05	0.5
Harvey	51	—10	18.2	1.41	1.1
Hayward	48	—28	13.6	0.22	2.2
Hillsboro	53	—19	14.4	1.05	3.0
Knapp [d]	62	—13	20.0	.....	.....
Koepenick	46	—18	15.2	0.90	7.0
Ladysmith	46	—27	13.6	0.83	0.5
Lancaster	49	—14	15.7	0.89	3.5
Madison	50	—11	17.9	1.46	0.5
Manitowoc	51	— 8	20.6	2.27	0.2
Meadow Valley	55	—17	14.0	0.78	2.0
Medford	47	—17	16.6	1.60	.....
Menasha				1.51	0.2
Neillsville	50	—18	14.2	0.60	T.
New London	50	—12	17.4	2.11	1.0
North Crandon	44	—17	14.6	1.02	3.0
Oconto	50	— 7	20.1	1.93	.....
Osceola	47	—30	12.8	1.42	10.1
Oshkosh	54	—13	19.7	1.45	.....
Pepin	46	—16	19.9	0.83	4.0
Pine River	52	—14	17.1	1.92	0.8
Portage	53	—10	19.6	1.49	1.0
Port Washington	52	—14	19.2	2.30	2.5
Prairie du Chien *a*	53	—13	18.0	1.08	1.8
Prairie du Chien *b*				0.94	1.4
Prentice	44	—28[b]	14.1[d]	2.20	12.0
Racine	54	— 7	21.2	1.03	.....
Sheboygan	48	— 8	21.3	1.15	2.5
Spooner [b]	40	—17	8.0	0.25	.....
Stevens Point	50	—19	14.6	0.70	T.
Valley Junction	58	—20[c]	18.2[c]	.....	.....
Viroqua	50	—15	15.9	1.14	2.7
Watertown	51	—11	17.6	1.95	2.8
Waukesha	49	—10	20.6	1.39	1.5
Waupaca	51	—14	16.6	2.12	0.5
Wausau	47	—16	17.4	1.94	1.4
Wausaukee	48	—12	18.2	2.00	T.
Westfield	51	—12	18.1	0.95	3.0
Whitehall	50	—26	14.0	0.93	2.2
Wyoming.					
Alcova	60	—11	33.8	T.	T.
Basin	56	—17	23.4	0.14	1.4
Bedford	55	—25	28.6	1.48	14.8
Border	46	—21	24.1	1.58	13.5
Buffalo	63	—14	28.6	0.10	0.6
Casper	59	— 3	35.0	.....	.....
Centennial	45	0	23.9	0.34	.....
Chugwater	60	—21	31.3	1.03	10.3
Daniel	47	— 7	20.6	T.	T.
Diamondville	53	0	27.6	0.35	3.1
Embar	66[c]	—10[c]	34.9[c]	0.10	1.0
Evanston	50	— 4	28.0	0.73	7.0
Fort Laramie	64	—27	27.6	0.10	4.5
Fort Washakie	63	—19	31.2	0.16	1.5
Fort Yellowstone	47	—19	26.7	0.61	6.1
Fourbear	50	—24	27.7	0.17	4.8
Griggs	63	— 7	30.0	0.49	2.7
Hyattville	58	—15	29.6	0.00	0.0
Irma	64	—12	32.4	0.65	6.5
Iron Mountain	57	—12	32.2	0.35	3.5
Kimball Ranch	68[c]	—15[c]	34.8[c]	0.70	7.0
Laramie	54	— 5	29.0	0.26	3.0
Leo	49	—14	25.8	0.26	8.0
Lovell	55	— 8	24.6	0.80	8.0
Lusk	55	—20	27.0	0.80	8.0
Moore	60	— 8	33.0	0.31	3.8
Parkman	59	—13	29.3	0.27	3.5
Pinebluff	61	—18	31.6	0.45	4.5
Rawlins	49	— 6	30.0	0.49	4.9
Red Bank	54	—12	30.1	0.61	.....
Rocksprings	70	— 3	32.6	0.08	.....
Saratoga	54	— 7	28.2	0.60	6.0
Thayne	49	—19	28.2	1.49	12.0
Thermopolis	59	—25	26.5	0.10	1.0
Cuba.					
Aguacate	95	40	70.8	2.19	
Alvarez				3.72	
Australia	87	43	69.8	1.83	
Banaguises	90	45	71.0	2.65	
Batabano	80	58	69.2	1.40	
Calimete	86	48	71.1	2.41	
Camajuani	98	36	68.6	0.83	
Ciego de Avila				1.29	
Cruces				4.03	
Gibara	90	56	70.5	0.35	
Guabairo				3.63	
Guanajay	84	53	68.0	2.98	
Guantanamo	89	55	73.2	0.52	
Guines	91	66	77.5	1.30	
Holguin	89	55	73.2	0.70	
Magdalena	85[e]	43[e]	68.3[b]	2.16	
Manzanillo	90			T.	
Matanzas	88	44	68.9	3.81	
Moron Trocha	89	45	69.4	1.77	
Nuevitas	92	59	75.2	0.24	
Pinar del Rio	85	49	69.9	2.59	
San Ceyetano	88	51	71.2	2.25	
Sancti Spiritus	83	49	69.1	1.06	
Santa Clara	91	42	69.8	1.44	
Santa Cruz del Sur	84	50	66.2	.....	
San Vincente				0.62	
Soledad	86	45	68.5	2.45	
Yaguajay	90	52	70.8	0.76	
Yateras				1.11	
Porto Rico.					
Adjuntas	86	51	70.5	0.52	
Aguadilla	87	64	75.7	1.01	
Aguirre	90	64	77.8	0.05	
Arecibo	92	58	75.4	0.15	
Barros	88	52	70.7	T.	
Bayamon	95	59	77.5	0.03	
Caguas	86	57	71.8	0.15	
Canovanas	92	66	78.2	0.28	
Cayey	97	54	74.5	0.35	
Cidra	87	60	76.9	0.00	
Coamo	91	58	75.6	0.60	
Corozal	93	51	73.5	0.30	
Fajardo	92	64	78.3	0.10	
Guayama				0.57	
Hacienda Coloso	89	56	72.8	0.37	
Hacienda Perla	89	64	76.0	0.26	
Humacao	86	70	79.0	0.35	
Isabela	89	62	75.6	4.76	
La Isolina	88	58	73.2	0.66	
Las Marias	91	62	75.4	0.51	
Manati	95	57	76.6	0.68	
Maunabo	89	65	77.8	1.22	
Mayaguez	93	61	75.0	0.39	
Ponce	86	60	75.0	T.	
San German [b]	88	65	78.0	0.12	
San Salvador	86	57	71.9	0.36	
Santa Isabel	89	62	76.4	0.26	
Utuado	91	55	74.6	1.10	
Yauco	84	60	75.4	0.12	
Mexico.					
Ciudad P. Diaz	88	35	54.8	0.70	
Leon de Aldamas	80	30	59.0	T.	
Puebla	72	41	59.0	0.00	
New Brunswick.					
St. John	45	— 4	23.3	2.58	19.2
Isthmus of Panama.					
Alhajuela				0.35	
La Boca	90	72	81.7	0.04	

Late reports for January, 1902.

Alaska.					
Fort Liscum	44	—14	22.0	9.64	127.5
Orca	41	5	29.3	12.02	25.0
California.					
Campo				4.28	
Mutah				0.75	6.0
San Miguel Island	75	38	53.8	1.56	
Yuba City [b]	62	26	45.8	1.43	
Idaho.					
Riddle	55	—19	24.4	0.53	4.5
Illinois.					
Benton	65	3	23.2	0.60	1.0
Mascoutah	55	— 2	30.2	1.36	5.8
Iowa.					
Emerson				0.34	2.6
Maryland.					
Chestertown	50	13	30.6	3.88	8.8
New Jersey.					
Rancocas				3.33	7.0
New Mexico.					
Fort Bayard	67	15	40.6	0.15	1.5
Fort Wingate	68	— 4	34.4	1.95	15.2
Ohio.					
Logan	54	7	28.4	.....	.....
Orangeville	46	—11	22.7	1.55	13.0
Oklahoma.					
Chandler	72	3	37.3	0.39	0.5
Oregon.					
Junction City [f]	65	18	41.6	2.40	2.0
South Dakota.					
Rochford	55	—26	19.6	0.40	1.2
Tennessee.					
Dover	65	11	36.6	.....	.....

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Texas.	°	°	°	*Ins.*	*Ins.*
Austin *a*	73	20	47.8	0.30	
Fort Clark	.....	22	.....	0.08	
Mann	74	15	45.0	0.47	
Trinity	76	23	47.8	1.47	
Virginia.					
Manassas	57	10	33.5	1.90	5.0
Porto Rico.					
Vieques	84	66	75.2	7.80	

CORRECTIONS.

August, 1901, Maryland, Deer Park, make mean temperature 67.4 instead of 76.4.

September, 1901, Kansas, Olathe, make mean temperature 68.6 instead of 78.6.

November, 1901, Illinois, Chemung, make mean temperature 34.2 instead of 44.2. Maine, Rumford Falls, make mean temperature 28.2 instead of 23.2.

December, 1901, Arkansas, Hardy, make mean temperature 34.6 instead of 44.6. Louisiana, Donaldsonville, make mean temperature 52.6 instead of 62.6.

TABLE III.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of February, 1902.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	24	7	11	23	n. 35 w.	21
Portland, Me	24	7	5	31	n. 57 w.	31
Northfield, Vt	17	32	4	10	s. 22 w.	16
Boston, Mass	19	7	10	32	n. 61 w.	25
Nantucket, Mass	16	6	14	31	n. 60 w.	20
Block Island, R. I	15	4	16	30	n. 52 w.	18
New Haven, Conn	28	4	7	29	n. 42 w.	32
Middle Atlantic States.						
Albany, N. Y	30	11	8	19	s. 51 w.	14
Binghamton, N. Y.†	8	2	10	12	n. 18 w.	6
New York, N. Y	26	5	10	29	n. 42 w.	28
Harrisburg, Pa.†	13	5	6	14	n. 45 w.	11
Philadelphia, Pa	29	6	10	26	n. 35 w.	28
Scranton, Pa	23	6	17	19	n. 7 w.	17
Atlantic City, N. J	29	7	16	23	n. 18 w.	23
Cape May, N. J	25	4	12	28	n. 37 w.	26
Baltimore, Md	15	8	8	33	n. 74 w.	26
Washington, D. C	27	8	3	26	n. 50 w.	23
Lynchburg, Va	27	4	10	27	s. 36 w.	29
Norfolk, Va	23	13	13	23	n. 45 w.	14
Richmond, Va	30	6	9	21	n. 27 w.	27
South Atlantic States.						
Charlotte, N. C	23	13	14	17	n. 17 w.	10
Hatteras, N. C	32	8	14	14	n.	24
Raleigh, N. C	28	7	6	27	n. 45 w.	16
Wilmington, N. C	20	13	8	26	n. 42 w.	27
Charleston, S. C	18	9	10	28	n. 63 w.	20
Columbia, S. C	19	9	13	28	n. 56 w.	18
Augusta, Ga	12	7	13	31	n. 74 w.	19
Savannah, Ga	20	10	8	29	n. 65 w.	23
Jacksonville, Fla	20	12	11	30	n. 67 w.	21
Florida Peninsula.						
Jupiter, Fla	22	14	5	27	n. 70 w.	23
Key West, Fla	26	13	15	17	n. 9 w.	13
Tampa, Fla	22	12	11	22	n. 48 w.	15
Eastern Gulf States.						
Atlanta, Ga	28	7	13	26	n. 31 w.	25
Macon, Ga.†	16	3	4	15	n. 40 w.	17
Pensacola, Fla.†	15	2	8	10	n. 9 w.	13
Mobile, Ala	20	14	9	15	n. 45 w.	8
Montgomery, Ala	24	14	12	21	n. 42 w.	14
Meridian, Miss†	15	2	8	10	n. 9 w.	13
Vicksburg, Miss	22	13	19	15	n. 24 e.	10
New Orleans, La	32	10	16	14	n. 5 e.	22
Western Gulf States.						
Shreveport, La	20	16	17	16	n. 14 e.	4
Fort Smith, Ark	16	5	26	19	n. 32 e.	13
Little Rock, Ark	24	11	21	15	n. 25 e.	14
Corpus Christi, Tex	22	17	20	10	n. 63 e.	11
Fort Worth, Tex	23	18	11	17	n. 50 w.	8
Galveston, Tex	25	13	21	12	n. 37 e.	15
Palestine, Tex	22	19	13	11	n. 34 e.	4
San Antonio, Tex	24	16	17	14	n. 21 e.	8
Taylor, Tex.†	11	10	2	9	n. 82 w.	7
Ohio Valley and Tennessee.						
Chattanooga, Tenn	24	13	9	23	n. 52 w.	18
Knoxville, Tenn	24	10	11	24	n. 43 w.	19
Memphis, Tenn	30	10	14	17	n. 9 w.	20
Nashville, Tenn	31	10	11	24	n. 31 w.	25
Lexington, Ky.†	7	4	7	15	n. 69 w.	8
Louisville, Ky	21	13	8	26	n. 66 w.	20
Evansville, Ind.†	16	3	6	10	n. 17 w.	14
Indianapolis, Ind	24	13	10	21	n. 45 w.	16
Cincinnati, Ohio	18	12	18	24	n. 45 w.	8
Columbus, Ohio	19	10	13	26	n. 55 w.	16
Pittsburg, Pa	30	12	9	23	n. 38 w.	23
Parkersburg, W. Va	21	11	8	24	n. 58 w.	19
Elkins, W. Va	19	9	3	33	n. 72 w.	32
Lower Lake Region.						
Buffalo, N. Y	10	17	11	27	s. 66 w.	18
Oswego, N. Y	17	20	15	20	s. 59 w.	6
Rochester, N. Y	9	21	11	26	s. 51 w.	19
Erie, Pa	19	13	9	25	n. 39 w.	17
Cleveland, Ohio	18	18	9	22	w.	13
Sandusky, Ohio	6	9	8	12	s. 53 w.	5
Toledo, Ohio	14	16	12	23	s. 80 w.	11
Detroit, Mich	17	11	10	28	n. 72 w.	19
Upper Lake Region.						
Alpena, Mich	15	16	7	31	s. 89 w.	24
Escanaba, Mich	17	18	4	28	s. 88 w.	24
Grand Haven, Mich	21	16	8	25	n. 74 w.	18
Houghton, Mich.†	12	3	5	13	n. 42 w.	12
Marquette, Mich	19	13	5	34	n. 78 w.	30
Port Huron, Mich	21	15	6	22	n. 59 w.	17
Sault Ste. Marie, Mich	17	16	15	23	n. 83 w.	8
Chicago, Ill	19	14	13	26	n. 69 w.	14
Milwaukee, Wis	14	11	4	34	n. 67 w.	33
Green Bay, Wis	10	24	6	27	s. 56 w.	25
Duluth, Minn	18	14	8	32	n. 81 w.	24
North Dakota.						
Moorhead, Minn	20	16	12	24	n. 76 w.	12
Bismarck, N. Dak	26	6	18	21	n. 9 w.	20
Williston, N. Dak	23	12	11	21	n. 42 w.	15

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
Upper Mississippi Valley.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
St. Paul, Minn	20	18	12	24	n. 81 w.	12
La Crosse, Wis.†	8	13	3	7	s. 39 w.	6
Davenport, Iowa	13	8	14	29	n. 72 w.	16
Des Moines, Iowa	23	11	16	19	n. 14 w.	13
Dubuque, Iowa	20	14	11	26	n. 68 w.	16
Keokuk, Iowa	21	14	12	24	n. 60 w.	14
Cairo, Ill	28	12	13	19	n. 21 w.	17
Springfield, Ill	21	14	12	21	n. 52 w.	11
Hannibal, Mo.†	6	9	6	13	s. 67 w.	8
St. Louis, Mo	21	12	10	23	n. 55 w.	16
Missouri Valley.						
Columbia, Mo.*	13	3	7	11	n. 23 w.	11
Kansas City, Mo	24	12	17	15	n. 9 e.	12
Springfield, Mo	24	13	18	16	n. 10 e.	19
Lincoln, Nebr	23	18	14	10	n. 39 e.	6
Omaha, Nebr	21	19	14	15	n. 27 w.	2
Valentine, Nebr	20	14	9	25	n. 69 w.	17
Sioux City, Iowa†	9	8	9	9	n.	1
Pierre, S. Dak	20	13	20	13	n. 45 e.	10
Huron, S. Dak	17	19	15	19	s. 63 w.	4
Yankton, S. Dak.†	7	8	5	15	s. 84 w.	10
Northern Slope.						
Havre, Mont	13	12	15	28	n. 86 w.	13
Miles City, Mont	22	11	12	23	n. 45 w.	16
Helena, Mont	10	19	6	39	s. 75 w.	34
Kalispell, Mont	10	9	6	40	n. 88 w.	34
Rapid City, S. Dak	23	11	14	21	n. 30 w.	14
Cheyenne, Wyo	20	12	2	23	n. 69 w.	24
Lander, Wyo	12	20	18	17	s. 7 e.	8
North Platte, Nebr	13	17	14	22	s. 63 w.	9
Middle Slope.						
Denver, Colo	26	14	17	16	n. 5 e.	12
Pueblo, Colo	21	10	15	21	n. 27 w.	12
Concordia, Kans	21	16	16	13	n. 31 e.	6
Dodge, Kans	27	11	17	15	n. 7 e.	16
Wichita, Kans	27	14	20	5	n. 49 e.	20
Oklahoma, Okla	26	17	14	6	n. 42 e.	12
Southern Slope.						
Abilene, Texas	18	23	11	18	s. 54 w.	9
Amarillo, Tex	22	16	15	14	n. 9 e.	6
Southern Plateau.						
El Paso, Texas	25	3	11	31	n. 42 w.	30
Santa Fe, N. Mex	29	10	12	19	n. 20 w.	20
Flagstaff, Ariz	17	15	3	29	n. 86 w.	26
Phoenix, Ariz	9	9	24	25	w.	1
Yuma, Ariz	15	14	19	18	n. 45 e.	1
Independence, Cal	14	26	11	17	s. 27 w.	13
Middle Plateau.						
Carson City, Nev	4	27	11	21	s. 23 w.	25
Winnemucca, Nev	9	21	13	24	s. 43 w.	16
Modena, Utah	9	13	5	38	s. 83 w.	33
Salt Lake City, Utah	13	23	17	20	s. 17 w.	10
Grand Junction, Colo	27	6	11	26	n. 35 w.	26
Northern Plateau.						
Baker City, Oreg	7	32	23	13	s. 22 e.	26
Boise, Idaho	8	25	25	15	s. 30 e.	20
Lewiston, Idaho†	4	12	16	4	s. 56 e.	14
Pocatello, Idaho	8	32	22	14	s. 18 e.	25
Spokane, Wash	10	21	27	8	s. 60 e.	22
Walla Walla, Wash	5	43	2	12	s. 15 w.	39
North Pacific Coast Region.						
Neah Bay, Wash	0	12	43	6	s. 72 e.	39
Port Crescent, Wash.*	0	10	12	11	s. 6 e.	10
Seattle, Wash	9	32	17	9	s. 19 e.	24
Tacoma, Wash	15	28	7	17	s. 38 w.	16
Astoria, Oreg	10	28	22	10	s. 34 e.	22
Portland, Oreg	9	28	22	9	s. 34 e.	23
Roseburg, Oreg	8	30	25	8	s. 38 e.	22
Middle Pacific Coast Region.						
Eureka, Cal	3	39	15	12	s. 5 e.	31
Mount Tamalpais, Cal	6	35	11	21	s. 19 w.	31
Red Bluff, Cal	6	33	29	8	s. 38 e.	34
Sacramento, Cal	5	35	30	5	s. 40 e.	39
San Francisco, Cal	3	31	17	19	s. 4 w.	28
South Pacific Coast Region.						
Fresno, Cal	20	12	21	16	n. 32 e.	9
Los Angeles, Cal	20	5	16	26	n. 34 w.	18
San Diego, Cal	30	7	15	22	n. 17 w.	24
San Luis Obispo, Cal	19	18	1	29	n. 37 w.	19
West Indies.						
Basseterre, St. Kitts Island	10	11	32	1	s. 88 e.	31
Bridgetown, Barbados	8	4	52	0	n. 86 e.	52
Cienfuegos, Cuba	28	15	23	4	n. 56 e.	23
Grand Turk†	7	9	13	4	s. 77 e.	9
Havana, Cuba	18	14	21	16	n. 51 e.	6
Kingston, Jamaica						
Port of Spain, Trinidad						
Puerto Principe, Cuba	26	13	27	7	n. 57 e.	24
Roseau, Dominica, W. I						
San Juan, Porto Rico	3	37	29	1	s. 39 e.	40
Santiago de Cuba, Cuba	23	19	16	11	n. 51 e.	6
Santo Domingo, W. I						
Willemstad, Curaçao	3	6	52	0	s. 87 e.	53

* From observations at 8 p. m. only.

† From observations at 8 a. m. only.

TABLE IV.—*Thunderstorms and auroras, February, 1902.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	52	T.	7	1												10					4	2						4	21	5				54	8	T.
		A.																																0	0	A.
Arizona	56	T.																										1						1	1	T.
		A.																																0	0	A.
Arkansas	57	T.													3	10					12				1	3		3	9					41	7	T.
		A.																																0	0	A.
California	167	T.														4		8				1	9				23	16	2					63	7	T.
		A.																																0	0	A.
Colorado	81	T.																							1			1						2	2	T.
		A.																																0	0	A.
Connecticut	21	T.																												20				20	1	T.
		A.																																0	0	A.
Delaware	5	T.																												3				3	1	T.
		A.																																0	0	A.
Dist. of Columbia	4	T.																												1				1	1	T.
		A.																																0	0	A.
Florida	47	T.															1				3	14	5			11	4	2	5	10				55	9	T.
		A.																																0	0	A.
Georgia	55	T.	6	1																		4	5		1	7			34	17				75	8	T.
		A.																																0	0	A.
Idaho	34	T.																	1															1	1	T.
		A.																																0	0	A.
Illinois	92	T.																										3	3	1				7	3	T.
		A.																																0	0	A.
Indiana	58	T.																											1	9				10	2	T.
		A.													1																			1	1	A.
Indian Territory	11	T.														1					1							4						6	3	T.
		A.																																0	0	A.
Iowa	149	T.																									1							1	1	T.
		A.				2				1										1					1									5	4	A.
Kansas	77	T.																			1							3	1					5	3	T.
		A.																																0	0	A.
Kentucky	41	T.																												17				17	1	T.
		A.			1																													1	1	A.
Louisiana	46	T.	9													1					8	2			12	4		5	7					48	8	T.
		A.																																0	0	A.
Maine	19	T.	1	8																														9	2	T.
		A.																																0	0	A.
Maryland	48	T.																											1	40				41	2	T.
		A.										1	1			1																		3	3	A.
Massachusetts	48	T.																												1				1	1	T.
		A.																																0	0	A.
Michigan	106	T.																																0	0	T.
		A.									1						1	1																3	5	A.
Minnesota	67	T.																					1			3								1	1	T.
		A.																						1										0	0	A.
Mississippi	44	T.	4													16					4	3			2	3		2	16	1				51	9	T.
		A.	1					1			1										1													4	4	A.
Missouri	95	T.														7		6			1	1						2	21	1				39	7	T.
		A.																																0	0	A.
Montana	40	T.																		1														1	1	T.
		A.																																0	0	A.
Nebraska	142	T.																							1									1	1	T.
		A.	1					1			1										1													4	4	A.
Nevada	40	T.																																0	0	T.
		A.																																0	0	A.
New Hampshire	19	T.		8																														8	1	T.
		A.																																0	0	A.
New Jersey	51	T.	1																										1	34				36	3	T.
		A.																																0	0	A.
New Mexico	31	T.																									1	2	1	1				5	4	T.
		A.																																0	0	A.
New York	99	T.																											2	10				12	2	T.
		A.			1																									1				2	2	A.
North Carolina	56	T.	2																								2		15	33				50	3	T.
		A.																																0	0	A.
North Dakota	48	T.																																0	0	T.
		A.																																0	0	A.
Ohio	128	T.																											3	30				33	2	T.
		A.																																0	0	A.
Oklahoma	23	T.																																0	0	T.
		A.																																0	0	A.
Oregon	74	T.						3	5	1	5	3	3	2		1	2	2	1	1				1	2	3	8	9	6					58	18	T.
		A.																																0	0	A.
Pennsylvania	91	T.																												36				36	1	T.
		A.																																0	0	A.
Rhode Island	7	T.																												1				1	1	T.
		A.																																0	0	A.
South Carolina	46	T.														1	1						4			6	3		16	23				56	8	T.
		A.																																0	0	A.
South Dakota	56	T.																										1	1					1	1	T.
		A.																									1							1	1	A.
Tennessee	56	T.														1													8	5				14	3	T.
		A.																																0	0	A.
Texas	95	T.		1		1			1	1										2	9				15	1		6	4					41	10	T.
		A.																																0	0	A.
Utah	47	T.																	3								1	8						12	3	T.
		A.																																0	0	A.
Vermont	16	T.	1																											2				3	2	T.
		A.																																0	0	A.
Virginia	50	T.																											2	22				24	2	T.
		A.																																0	0	A.
Washington	64	T.							1		3		2								2						1	2	2					13	7	T.
		A.																																0	0	A.
West Virginia	43	T.																											1	13				14	2	T.
		A.																										1						1	1	A.
Wisconsin	60	T.																									1							1	1	T.
		A.													1																			1	1	A.
Wyoming	31	T.																	1									1		1				3	3	T.
		A.																																0	0	A.
Sums	2,893	T.	31	19	0	1	0	3	7	2	8	3	5	2	3	52	4	16	6	4	43	29	24	1	35	38	45	75	182	337				975		T.
		A.	1	0	2	2	0	1	0	1	2	1	1	0	2	0	1	1	1	1	1	0	0	1	1	3	1	1	0	1				26		A.

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during February, 1902, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y	†			1.36														*			
Alpena, Mich	28			0.32														*			
Atlanta, Ga	27			3.63														0.61			
Atlantic City, N. J	28			0.56														0.45			
Baltimore, Md	20–21			2.13														*			
Binghamton, N. Y	†			0.96														0.20			
Bismarck, N. Dak	27–28			0.09														*			
Boise, Idaho	27			0.63														0.30			
Boston, Mass	†			1.72														0.41			
Buffalo, N. Y	12–13			0.50														*			
Cairo, Ill	14			0.42														*			
Charleston, S. C	28			0.65														0.51			
Charlotte, N. C	28			1.10														0.69			
Chattanooga, Tenn	27–28			1.82														0.29			
Chicago, Ill	27–28			0.86														*			
Cincinnati, Ohio	28			0.21														0.12			
Cleveland, Ohio	2			0.51														*			
Columbia, Mo	27			0.41														0.07			
Columbia, S. C	24–25			1.25														0.71			
Columbus, Ohio	28			0.09								0.09									
Corpus Christi, Tex	19			0.51														0.50			
Davenport, Iowa	27–28			0.60														*			
Denver, Colo	13			0.16														*			
Des Moines, Iowa	27–28			0.42														*			
Detroit, Mich	1–2			0.42														*			
Dodge, Kans	13–14			0.10														*			
Duluth, Minn	27–28			0.64														*			
Eastport, Me	2–3			1.50														*			
Elkins, W. Va	28			0.56														0.38			
Erie, Pa	2 3			0.17														*			
Escanaba, Mich	†			1.72														0.16			
Evansville, Ind	27			0.28														0.12			
Fort Smith, Ark	19–20			0.81														*			
Fort Worth, Tex	4–5			0.12														*			
Galveston, Tex	19			0.64														0.32			
Grand Junction, Colo	26			0.34														0.05			
Green Bay, Wis	27–28			1.34														*			
Harrisburg, Pa	28			0.57														0.18			
Hatteras, N. C	25	4:35 a. m.	8:15 a. m.	1.15	6:10 a. m.	7:00 a. m.	0.15	0.05	0.14	0.26	0.35	0.39	0.50	0.60	0.66	0.73	0.80	0.88			
Helena, Mont	10			0.17														*			
Huron, S. Dak	27–28			0.24														*			
Indianapolis, Ind	27–28			0.21														*			
Jacksonville, Fla	28			1.61														1.61*			
Jupiter, Fla	20–21	12:01 p. m.	6:30 a. m.	2.84	1:13 p. m.	2:00 p. m.	0.01	0.11	0.33	0.48	0.60	0.66	0.73	0.77	0.79	0.85	0.89	0.95			
	25	1:35 a. m.	2:45 a. m.	0.98	1:40 a. m.	2:10 a. m.	0.01	0.65	0.76	0.79	0.86	0.92	0.97								
Kalispell, Mont	11–12			0.42														*			
Kansas City, Mo	27			0.33														0.09			
Key West, Fla	20–21	10:15 p. m.	4:00 a. m.	2.99	12:05 a. m.	1:30 a. m.	0.05	0.21	0.55	0.74	0.97	1.15	1.34	1.55	1.78	1.95	2.09	2.38	2.75	2.88	
Knoxville, Tenn	27–28			1.84														0.38			
Lewiston, Idaho	11–12			0.57														0.07			
Lexington, Ky	11–12			0.34														*			
Lincoln, Nebr	27–28			0.09														*			
Little Rock, Ark	26–27			0.50														0.35			
Los Angeles, Cal	22			0.75														0.45			
Louisville, Ky	28			0.10														0.10			
Macon, Ga	27–28	7:25 a. m.	12:45 a. m.	1.68	9:40 p. m.	10:15 p. m.	0.48	0.08	0.22	0.39	0.46	0.50	0.65	0.76	0.79	0.83	0.85				
Memphis, Tenn	18			1.11														0.31			
Meridian, Miss	27			1.36														0.58			
Milwaukee, Wis	27–28			0.97														*			
Montgomery, Ala	14	6:30 p. m.	11:30 p. m.	0.96	7:30 p. m.	8:30 p. m.	0.03	0.04	0.24	0.37	0.44	0.49	0.52	0.56	0.60	0.64	0.67	0.85			
	27	7:35 a. m.	6:42 p. m.	4.50	9:25 a. m.	9:45 a. m.	0.40	0.07	0.21	0.58	0.63	0.66	0.68								
Nantucket, Mass	25			0.30														0.17			
Nashville, Tenn	27			0.65														0.24			
New Haven, Conn	28			1.13														0.74			
New Orleans, La	24	12:50 a. m.	6:00 a. m.	1.00	1:24 a. m.	1:50 a. m.	0.02	0.34	0.49	0.58	0.66	0.70	0.72	0.73							
New York, N. Y	21–22			2.50														0.30			
Norfolk, Va	1–2			1.47														0.38			
Northfield, Vt	†			0.64														0.13			
Oklahoma, Okla	19–20			0.14														*			
Omaha, Nebr	28			0.08														0.03			
Parkersburg, W. Va	28			1.06														0.37			
Philadelphia, Pa	28	7:40 a. m.	4:15 p. m.	1.36	1:00 p. m.	1:30 p. m.	0.12	0.25	0.57	0.78	0.85	0.90	0.97	1.01	1.04	1.07	1.08	1.11			
Pittsburg, Pa	27–28			0.48														*			
Pocatello, Idaho	25–26			0.75														0.16			
Portland, Me	†			2.12														0.69			
Portland, Oreg	8–9			1.59														0.23			
Pueblo, Colo	13–14			0.24														*			
Raleigh, N. C	27–28	9:10 p. m.	9:00 a. m.	1.01	6:06 a. m.	6:30 a. m.	0.20	0.16	0.35	0.44	0.49	0.53	0.54								
Richmond, Va	28			1.07														0.61			
Rochester, N. Y	2–3			1.14														*			
St. Louis, Mo	27–28			0.65														0.07			
St. Paul, Minn	27–28			0.58														0.10			
Salt Lake City, Utah	25–26			0.54														*			
San Diego, Cal	25–26			1.14														0.32			
Sandusky, Ohio	2			0.14														*			
San Francisco, Cal	8			0.97														0.42			
Savannah, Ga	28			0.76														0.49			
Scranton, Pa	28			1.50														0.67			
Seattle, Wash	14–16			2.04														0.20			
Spokane, Wash	9–10			0.70														*			
Springfield, Ill	26–27			0.50														0.12			
Tampa, Fla	20	6:10 a. m.	6:45 p. m.	3.90	6:20 a. m.	7:15 a. m.	T.	0.37	0.64	0.77	0.86	0.93	0.99	1.09	1.16	1.22	1.31	1.38			
Toledo, Ohio	23–24			0.22														*			
Topeka, Kans	14			0.28														*			
Valentine, Nebr	18–19			0.14														*			
Vicksburg, Miss	19–20			0.90														0.42			
Washington, D. C	28			1.13														0.42			
Wilmington, N. C	28	7:38 a. m.	10:00 a. m.	0.91	8:03 a. m.	8:20 a. m.	T.	0.29	0.51	0.69	0.73	0.76	0.78								
Yankton, S. Dak	10–11			0.20														*			
Basseterre, St. Kitts	3–4			0.22														0.08			
Bridgetown, Barbados	4–5			0.14														0.07			

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Cienfuegos, Cuba	21			0.78														0.43			
Havana, Cuba	9	4:00 p. m.	8:15 p. m.	0.73	7:45 p. m.	8:01 p. m.	0.16	0.08	0.29	0.49	0.52										
Puerto Principe, Cuba	25			0.16							0.16										
San Juan, Porto Rico	5			0.08														0.08			
Santiago de Cuba	9-10			0.28														0.27			
Willemstad, Curaçao	2			0.39														0.30			

*Self register not working. †February 28 to March 1.

TABLE VI.—*Data furnished by the Canadian Meteorological Service, February, 1902.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Depth of snow.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
St. Johns, N. F.	29.43	29.58	—.25	30.3	+ 8.3	34.5	26.0	6.13	+1.18	2.7
Sydney, C. B. I	29.63	29.67	—.25	28.1	+ 8.8	34.1	22.1	4.43	+0.24	22.5
Halifax, N. S	29.59	29.70	—.25	27.8	+ 5.4	34.3	21.2	2.73	—1.97	14.4
Grand Manan, N. B	29.66	29.71	—.27	26.5	+ 3.1	32.1	21.0	4.00	+0.44	35.8
Yarmouth, N. S	29.64	29.72	—.27	27.7	+ 1.9	33.0	22.4	3.12	—2.70	11.3
Charlottetown, P. E. I	29.65	29.69	—.26	24.6	+ 7.0	31.2	18.0	1.40	—2.30	10.6
Chatham, N. B	29.69	29.71	—.25	20.9	+ 8.4	31.7	10.1	2.74	—0.57	21.8
Father Point, Que	29.74	29.77	—.21	17.4	+ 5.9	25.9	8.8	1.95	+0.33	19.3
Quebec, Que	29.45	29.80	—.19	17.0	+ 5.2	24.4	9.5	2.24	—1.15	22.2
Montreal, Que	29.61	29.83	—.19	17.0	+ 2.5	23.7	10.3	3.59	+0.77	34.5
Bissett, Ont	29.27	29.91	—.10	12.2	+ 2.3	26.7	— 2.2	0.89	—1.43	4.9
Ottawa, Ont	29.57	29.91	—.11	16.0	+ 4.3	24.5	7.4	2.83	+0.14	24.3
Kingston, Ont	29.53	29.87	—.17	18.9	+ 1.1	27.5	10.3	1.15	—1.29	8.7
Toronto, Ont	29.52	29.93	—.11	21.2	— 0.3	28.1	14.3	1.51	—0.80	5.9
White River, Ont	28.54	29.91	—.11	12.1	+11.9	22.6	1.6	1.35	+0.13	13.4
Port Stanley, Ont	29.28	29.96	—.10	20.0	— 2.8	28.1	12.0	1.88	—1.04	13.6
Saugeen, Ont	29.18	28.91	—.11	21.2	+ 1.3	30.2	12.2	2.13	—0.31	19.5
Parry Sound, Ont	29.17	29.91	—.10	17.1	+ 2.8	28.5	5.7	2.23	—0.17	18.9
Port Arthur, Ont	29.23	29.97	—.08	15.0	+ 8.6	24.1	5.9	0.26	—1.07	2.4
Winnipeg, Man	29.19	30.07	—.03	10.4	+12.0	21.1	— 0.2	0.54	—0.63	5.4
Minnedosa, Man	28.18	30.09	.00	11.5	+14.2	22.1	0.8	1.16	+0.18	11.6
Qu'Appelle, Assin	27.70	30.06	—.02	9.4	+10.0	17.3	1.4	2.85	+2.18	28.5
Medicine Hat, Assin	27.64	30.04	—.01	16.0	+ 4.8	25.3	6.7	0.65	+0.21	6.5
Swift Current, Assin	27.36	30.07	.00	13.0	+ 5.0	21.9	4.2	0.88	+0.12	8.4
Calgary, Alberta	26.27	29.98	—.01	15.2	+ 1.7	23.3	7.1	0.60	—0.16	6.0
Banff, Alberta	25.17	29.93	—.05	21.0	+ 1.8	31.3	10.7	0.55	—0.59	5.4
Edmonton, Alberta	27.59	29.98	—.04	16.0	+ 7.7	24.5	7.5	0.80	+0.34	8.0
Prince Albert, Sask	28.44	30.09	—.02	9.3	+12.3	18.2	0.5	0.97	+0.24	9.7
Battleford, Sask	28.28	30.12	+.03	7.0	+ 6.9	15.9	— 1.9	0.66	+0.09	6.6
Kamloops, B. C	28.56	29.81	—.15	34.3	+ 6.0	41.3	27.3	1.24	+0.49	6.0
Victoria, B. C	29.67	29.77	—.23	44.6	+ 5.1	48.5	40.7	2.47	—1.64	0.1
Barkerville, B. C	25.38	29.72	—.19	27.1	+ 8.2	34.2	19.9	1.80	—0.95	14.0
Hamilton, Bermuda	29.73	29.89	—.22	59.7	— 1.8	64.3	55.1	8.09	+3.69	0.0

TABLE VII.—*Heights of rivers referred to zeros of gages, February, 1902.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.[1]	1,954	14	—0.2	28	—0.6	18–23	—0.5	0.4
Reeds Landing, Minn	1,884	12	3.2	28	1.6	8	2.2	1.6
La Crosse, Wis.[1]	1,819	12						
Prairie du Chien, Wis.[1]	1,759	18						
Dubuque, Iowa[1]	1,699	15						
Leclaire, Iowa[1]	1,609	10						
Davenport, Iowa[1]	1,593	15						
Muscatine, Iowa	1,562	16	3.3	28	2.4	6, 19, 20	2.7	0.9
Galland, Iowa[1]	1,472	8						
Keokuk, Iowa[1]	1,463	15						
Hannibal, Mo.[1]	1,402	13						
Grafton, Ill	1,306	23	3.4	11, 12	1.4	1	2.8	2.0
St. Louis, Mo.[2]	1,264	30						
Chester, Ill	1,189	30	5.2	27	—0.5	1	2.9	5.7
New Madrid, Mo	1,003	34	28.1	9	8.7	25	18.3	19.4
Memphis, Tenn	843	33	25.5	11	5.1	26, 27	15.5	20.4
Helena, Ark	767	42	33.0	12	10.0	28	22.2	23.0
Arkansas City, Ark	635	42	33.0	14	12.4	28	23.5	20.6
Greenville, Miss	595	42	28.4	14	9.9	1	20.1	18.5
Vicksburg, Miss	474	45	31.4	16	8.3	1	22.5	23.1
New Orleans, La	108	16	10.4	20	3.8	2, 3	7.5	6.6
Missouri River.								
Bismarck, N. Dak	1,309	14	3.0	1	0.4	15	1.6	2.6
Pierre, S. Dak.[1]	1,114	14						
Sioux City, Iowa[1]	784	19						
Omaha, Nebr.[1]	669	18						
St. Joseph, Mo	481	10	3.6	11–14	1.6	27	3.1	2.0
Kansas City, Mo.[2]	388	21						
Boonville, Mo[14]	199	20						
Hermann, Mo.[4]	103	24						
Illinois River.								
Peoria, Ill	135	14	8.1	28	7.0	1, 2	7.4	1.1
Youghiogheny River.								
Confluence, Pa	59	10	14.2	28	0.9	14–16	1.9	13.3
West Newton, Pa.[5]	15	23	22.0	28				
Allegheny River.								
Warren, Pa	177	14	10.0	28	0.9	14–23	1.2	9.1
Oil City, Pa	123	13	11.4	28	2.8	8–10	3.4	8.6
Parker, Pa	73	20	10.0	28	1.3	21–24	1.8	8.7
Monongahela River.								
Weston, W. Va	161	18	5.7	26	0.0	10–21	1.1	5.7
Fairmont, W. Va	119	25	15.0	26, 28	1.5	11–23	4.3	13.5
Greensboro, Pa.[6]	81	18	21.9	28	6.8	20–23	9.3	15.1
Lock No. 4, Pa	40	28	24.5	28	6.8	21	10.3	17.7
Conemaugh River.								
Johnstown, Pa	64	7	16.4	28	1.3	23	2.2	15.1
Red Bank Creek.								
Brookville, Pa	35	8	8.9	28	1.0	1–27	1.1	7.9
Beaver River.								
Elwood Junction, Pa.[5]	10	14						
Great Kanawha, River.								
Charleston, W. Va	58	30	23.5	26	4.0	20, 21	8.3	19.5
Little Kanawha River.								
Glenville, W. Va	103	20	12.5	26	—0.3	15, 16, 19, 20	2.5	12.8
New River.								
Hinton, W. Va	95	14	11.5	28	2.8	20, 21	4.5	8.7
Cheat River.								
Rowlesburg, W. Va.[7]	36	14	12.0	28				
Ohio River.								
Pittsburg, Pa	966	22	24.3	28	1.9	20–22	4.3	22.4
Davis Island Dam, Pa	960	25	22.4	28	3.6	22	5.9	18.8
Wheeling, W. Va	875	36	17.7	28	4.8	15, 16	8.5	12.9
Parkersburg, W. Va.[8]	785	36	17.0	28	4.5	24	10.7	12.5
Point Pleasant, W. Va	703	39	29.9	28	4.5	20–22	11.8	25.4
Huntington, W. Va	660	50	36.7	1	6.3	17	15.6	30.4
Catlettsburg, Ky	651	50	38.3	1	5.4	21, 22	15.5	32.9
Portsmouth, Ohio	612	50	39.4	1	6.8	22	16.6	32.6
Cincinnati, Ohio	499	50	41.7	2	8.4	23	19.2	33.3
Madison, Ind	413	46	36.4	2	9.6	18	18.3	26.8
Louisville, Ky	367	28	18.2	3	4.4	22	8.6	13.8
Evansville, Ind	184	35	35.8	5	6.4	24	19.1	29.4
Paducah, Ky.[13]	47	40	34.9	7, 8	8.3	23	20.0	26.6
Cairo, Ill	1,073	45	35.1	8	9.6	24	22.2	25.5
Muskingum River.								
Zanesville, Ohio	70	20	12.2	28	6.4	22	7.3	5.8
Scioto River.								
Columbus, Ohio[9]	110	17						
Miami River.								
Dayton, Ohio	77	18	2.1	25	0.8	1–23	1.0	1.3
Wabash River.								
Mount Carmel, Ill.[5]	50	15						
Licking River.								
Falmouth, Ky.[10]	30	25	12.9	1	2.0	12, 23	6.7	10.9
Kentucky River.								
Frankfort, Ky	65	31	27.0	1	6.4	16–18, 23	10.0	20.6
Clinch River.								
Speers Ferry, Va	156	20	26.6	28	0.3	15	2.5	26.3
Clinton, Tenn	52	25	22.0	1	5.1	21	8.9	16.9
Tennessee River.								
Knoxville, Tenn	635	29	14.8	28	2.6	20	5.7	12.2
Kingston, Tenn	556	25	14.4	2	3.5	18–20	6.3	10.9
Chattanooga, Tenn	452	33	23.2	3	5.2	21	10.1	18.0
Bridgeport, Ala	402	24	18.1	3	3.7	21	8.0	14.4
Florence, Ala	255	16	16.7	3, 4	4.7	21, 22	9.2	12.0
Riverton, Ala	225	25	26.3	4	5.8	22	3.4	20.5
Johnsonville, Tenn	95	24	27.5	4	7.0	22	15.8	20.5

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Cumberland River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Burnside, Ky	516	50	31.5	1	3.1	20	7.4	28.4
Carthage, Tenn	305	40	40.4	1	3.7	19, 20	12.1	36.7
Nashville, Tenn	189	40	40.9	4	5.8	20, 21	17.0	35.1
Clarksville, Tenn	126	42	47.4	4	8.7	20–22	22.8	38.7
Arkansas River.								
Wichita, Kans	832	10	2.0	27, 28	0.9	1–5	1.2	1.1
Webbers Falls, Ind. T.[16]	465	23						
Fort Smith, Ark	403	22	1.3	27, 28	—0.2	11	0.2	1.5
Dardanelle, Ark	256	21	3.4	28	0.3	14–20	0.8	3.1
Little Rock, Ark	176	23	8.1	27	2.7	16, 18, 19	4.2	5.4
White River.								
Newport, Ark	150	26	12.4	28	0.3	7–9, 16–18	1.8	12.1
Yazoo River.								
Yazoo City, Miss	80	25	16.6	28	11.3	1	15.1	5.3
Red River.								
Arthur City, Tex	638	27	2.8	1–4	2.6	11–28	2.6	0.2
Fulton, Ark	515	28	11.1	27	4.0	20, 21	7.3	7.1
Shreveport, La	327	29	7.4	4	1.1	23	4.0	6.3
Alexandria, La	118	33	4.9	9	—1.5	1	2.5	6.4
Ouachita River.								
Camden, Ark	304	39	31.1	5	9.0	20	20.3	22.1
Monroe, La	122	40	21.3	21, 22	11.0	1	18.0	10.3
Atchafalaya River.								
Melville, La	100	31	26.8	17	11.0	1	21.7	15.8
Susquehanna River.								
Wilkesbarre, Pa	183	14	6.5	1–3	2.6	18–22	4.2	3.9
Harrisburg, Pa	69	17	9.7	28	2.0	6	4.6	7.7
West Branch Susquehanna.								
Williamsport, Pa	39	20	17.0	28	1.8	24, 25	3.1	15.2
Juniata River.								
Huntingdon, Pa.[9]	90	24	9.7	28				
Potomac River.								
Cumberland, Md.[11]	290	8	15.8	28	2.5	20	3.6	13.3
Harpers Ferry, W. Va	172	16	24.0	27	0.7	12	4.0	23.3
James River.								
Lynchburg, Va	260	18	14.2	26	1.1	20	3.7	13.1
Richmond, Va	111	12	17.0	27	0.6	17, 20, 21	3.0	16.4
Roanoke River.								
Weldon, N. C	129	30	38.2	28	9.8	18, 21	17.4	28.4
Cape Fear River.								
Fayetteville, N. C	112	38	40.3	4	6.8	16	18.7	33.5
Edisto River.								
Edisto, S. C	75	6	5.4	19	3.2	3	4.8	2.2
Pedee River.								
Cheraw, S. C	149	27	33.5	3	4.6	14	14.9	28.9
Black River.								
Kingstree, S. C	52	12	8.3	14, 15	4.7	1	6.9	3.6
Lynch Creek.								
Effingham, S. C	35	12	15.0	8	6.8	21, 22	9.1	8.2
Santee River.								
St. Stephens, S. C	97	12	14.7	10	7.6	1	9.3	7.1
Congaree River.								
Columbia, S. C	37	15	21.7	3	2.0	16	6.1	19.7
Wateree River.								
Camden, S. C	45	24	29.9	3	9.7	17	15.7	20.2
Waccamaw River.								
Conway, S. C	40	7	5.6	26–28	3.3	1, 5	4.7	2.3
Savannah River.								
Calhoun Falls, S. C	347	15	16.4	28	3.7	13–15	5.4	12.7
Augusta, Ga	268	32	32.6	3	10.2	13–15	15.0	22.4
Broad River.								
Carlton, Ga	30	11	24.5	28	3.2	14	5.8	21.3
Flint River.								
Albany, Ga	80	20	15.4	11	3.1	1	9.1	12.3
Chattahoochee River.								
Westpoint, Ga	239	20	18.0	28	3.9	14	6.4	14.1
Ocmulgee River.								
Macon, Ga	125	18	22.3	28	4.9	14	8.6	17.4
Oconee River.								
Dublin, Ga	79	30	20.0	7	4.0	1	8.8	16.0
Coosa River.								
Rome, Ga	271	30	25.7	3	3.8	14, 15	8.0	21.9
Gadsden, Ga	144	18	21.3	4	4.5	22	9.5	16.8
Alabama River.								
Montgomery, Ala	265	35	37.6	5	7.6	14	16.7	30.0
Selma, Ala	212	35	37.9	6, 7	11.6	15	20.3	26.3
Tombigbee River.								
Columbus, Miss	303	33	19.0	5	1.4	14	8.6	17.6
Demopolis, Ala	155	35	45.9	8	18.8	24	31.5	27.1
Black Warrior River.								
Tuscaloosa, Ala	129	43	48.4	3	11.0	14	23.5	37.4
Brazos River.								
Kopperl, Tex	369	21	—1.6	1–28	—1.6	1–28	—1.6	0.0
Waco, Tex	301	22	0.9	5–28	0.8	1–4	0.9	0.1
Booth, Tex	76	39	—0.4	1–7	—0.6	20–28	—0.5	0.2
Red River of the North.								
Moorhead, Minn.[9]	418	26						
Columbia River.								
Umatilla, Oreg.[12]	270	25	5.0	19	—0.2	10	3.2	5.2
The Dalles, Oreg	166	40	7.8	21	—0.8	4	4.2	8.6
Willamette River.								
Albany, Oreg	118	20	17.0	11	3.0	1	9.0	14.0
Portland, Oreg.	12	15	10.8	12, 13	0.1	2	7.1	10.7
Sacramento River.								
Red Bluff, Cal	265	23	27.0	26	0.6	1	15.1	26.4
Sacramento, Cal	64	29	27.6	28	9.8	1	18.8	17.8

[1] Frozen entire month. [2] Frozen for 21 days. [3] Frozen for 19 days. [4] Frozen for 26 days. [5] Frozen for 27 days. [6] Frozen for 1 day. [7] Frozen for 20 days. [8] Frozen for 12 days. [9] Frozen for 25 days. [10] Frozen for 10 days. [11] Frozen for 14 days. [12] Frozen from 9 days. [13] Frozen for 2 days. [14] Frozen for 24 days. [15] No record.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physical Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San Jose de Costa Rica, during February, 1902.*

Hours.	Pressure.		Temperature.		Relative humidity.		Rainfall.		
	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	Duration, 1902.
	660+ *Mm.*	660+ *Mm.*	° *C.*	° *C.*	%	%	*Mm.*	*Mm.*	*Hrs.*
1 a. m	4.90	4.28	16.78	16.45	84	83	0.0	0.0	0.00
2 a. m	4.52	3.79	16.24	16.20	86	84	0.0	0.0	0.00
3 a. m	4.18	3.46	16.10	15.95	84	84	0.0	0.0	0.00
4 a. m	4.04	3.30	15.94	15.75	84	84	0.5	0.1	0.17
5 a. m	4.10	3.39	15.71	15.64	84	84	0.0	0.0	0.00
6 a. m	4.31	3.69	15.46	15.51	85	84	0.0	0.1	0.00
7 a. m	4.70	4.12	15.50	15.55	85	84	0.0	0.0	0.00
8 a. m	4.85	4.48	16.66	16.67	76	78	0.0	0.0	0.00
9 a. m	5.02	4.72	19.39	19.20	65	70	0.0	0.0	0.00
10 a. m	5.10	4.90	21.75	21.40	60	62	0.0	0.0	0.00
11 a. m	5.11	4.80	23.65	23.20	53	58	0.0	0.0	0.00
12 m	4.77	4.38	25.04	24.26	48	56	0.0	0.0	0.00
1 p. m	4.28	3.85	25.87	25.07	51	54	0.0	0.0	0.00
2 p. m	3.76	3.30	26.08	25.15	48	53	0.0	0.0	0.00
3 p. m	3.38	2.79	25.24	24.75	52	55	0.0	0.1	0.00
4 p. m	3.24	2.54	23.33	23.74	63	58	3.5	0.1	0.42
5 p. m	3.37	2.64	21.82	22.12	67	63	0.2	0.1	0.50
6 p. m	3.68	2.88	20.40	20.52	74	70	0.8	0.0	0.25
7 p. m	4.05	3.33	19.26	18.85	78	76	0.0	0.1	0.00
8 p. m	4.25	3.85	18.59	18.14	82	79	0.0	0.1	0.00
9 p. m	4.79	4.25	18.29	17.75	81	80	6.4	0.7	0.75
10 p. m	5.05	4.54	17.85	17.31	83	82	5.5	0.1	1.83
11 p. m	5.17	4.66	17.55	17.00	83	83	0.4	0.0	0.83
Midnight	5.09	4.53	17.15	16.70	84	83	0.0	0.0	0.00
Mean	664.40	663.85	19.44	19.33	73	73			
Minimum	660.80	659.35	12.2	8.2	26				
Maximum	666.40	667.72	30.7	32.0	98		6.4		
Total							17.3	1.5	4.75

REMARKS.—The barometer is 1,169 meters above sea level. Readings are corrected for gravity, temperature, and instrumental error. The dry and wet bulb thermometers are 1.5 meters above ground and corrected for instrumental errors. The hourly readings for pressure, and wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The hourly rainfall is as given by Hottinger's self-register, checked once a day. Under maximum, the greatest hourly rainfall for the month is given. The standard rain gage is 1.5 meters above ground. Since January 1, 1902, observations at San Jose have been made on seventy-fifth meridian time, which is 0 hours, 36 minutes, 13.3 seconds *in advance* of San Jose local time. The normals for pressure, temperature, and relative humidity have been adjusted to this time; the normal for rainfall in Table 1 and the sunshine observations and normal in Table 2 refer to local time.

TABLE 2.

Time.	Sunshine.		Cloudiness.		Temperature of the soil at depth of—				
	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	0.15 *m.*	0.30 *m.*	0.60 *m.*	1.20 *m.*	3.00 *m.*
	Hours.	*Hours.*	%	%	° *C.*	° *C.*	° *C.*	° *C.*	° *C.*
7 a. m	10.63	10.35	42	32	21.04	20.63	21.31	20.22	20.43
8 a. m	20.08	22.76							
9 a. m	21.75	22.08							
10 a. m	20.92	21.18	44	38	21.34	20.69	21.12	20.23	
11 a. m	21.18	21.42							
12 m	21.82	21.21							
1 p. m	20.10	21.29	44	44	21.96	21.63	21.10	20.21	
2 p. m	20.75	21.82							
3 p. m	17.93	21.45							
4 p. m	13.89	19.12	63	53	23.00	21.91	21.37	20.27	
5 p. m	14.05	14.56							
6 p. m	4.97	4.27							
7 p. m			70	54	22.21	21.85	21.38	20.22	
8 p. m									
9 p. m									
10 p. m			55	43	21.97	21.80	21.38	20.23	
11 p. m									
Midnight									
Mean			55	44	21.92	21.63	21.28	20.24	20.43
Total	210.07	221.51							

TABLE 3.—*Rainfall at stations in Costa Rico, February, 1902.*

Stations.	Height above sea level.	Observed, 1902.		Normals.		
		Amount.	Number of days.	Number of years.	Amount.	Number of days.
		Mm.			*Mm.*	
Sipurio (Talamanca)	60	*	*	1	78	11
Boca Banano	3	292	13	6	176	16
Limon	3	208	12	7	121	10
Swamp Mouth	3	222	6	2	175	10
Zent	20	225	8	11 mo.		
Siquirres	60	291	9	2	165	8
Guapiles	300	200	4	1	114	8
Cariblanco (Sarapiqui)	835	422	16	3	194	19
San Carlos	161	181	11	3	179	9
Las Lomas	266	298	8	1	131	10
Peralta	332	363	12	3	163	10
Turrialba	620	*	*	5	56	10
Juan Viñas	1,040	77	7	5	79	6
Santiago	1,100	158	13	11 mo.		
Paraiso	1,336	43	7	8 mo.		
Cachi		105	6	3 mo.		
Orosi	1,068					
Las Concavas		33	12	8 mo.		
Cartago	1,450	22	10	5	27	6
Tres Rios	1,300	15	3	13	9	6
San Francisco Guad	1,187	14	4	6	9	3
San Jose	1,160	17	3	13	5	2
La Verbena	1,140	3	3	5	10	2
Nuestro Amo		7	3	6	11	2
Alajuela	950	53	4	1	1	1
San Isidro Alajuela	1,346	83	2	11 mo.		

* Observations not received.

TABLE 4.—*Observations taken at the stations of Port Limon and Zent, February, 1902.*

Stations.	Pressure.			Temperature.			Relative humidity.
	Minimum.	Maximum.	Mean.	Minimum.	Maximum.	Mean.	
	Inches.	*Inches.*	*Inches.*	°	°	°	%
Port Limon	761.7	668.3	765.69	19.5	31.0	24.35	84
Zent				17.8	33.6	25.38	81

Stations.	Cloudiness.	Sunshine.	Rainfall.		Temperature of soil at depth of—		
			Amount.	Number of days.	0.15 *m.*	0.30 *m.*	0.60 *m.*
	%	*Hours.*	*Mm.*		°	°	°
Port Limon	61		208	12			
Zent	61	156.52	225	8	25.70	25.55	25.56

REMARKS.—At Port Limon the hours of direct observation are 8 a. m. and 2 and 8 p. m., San Jose local time; the means for temperature and relative humidity are obtained from two-hourly readings given by a Richard self-registering thermometer.

Chart I. Tracks of Centers of High Areas. February, 1902.

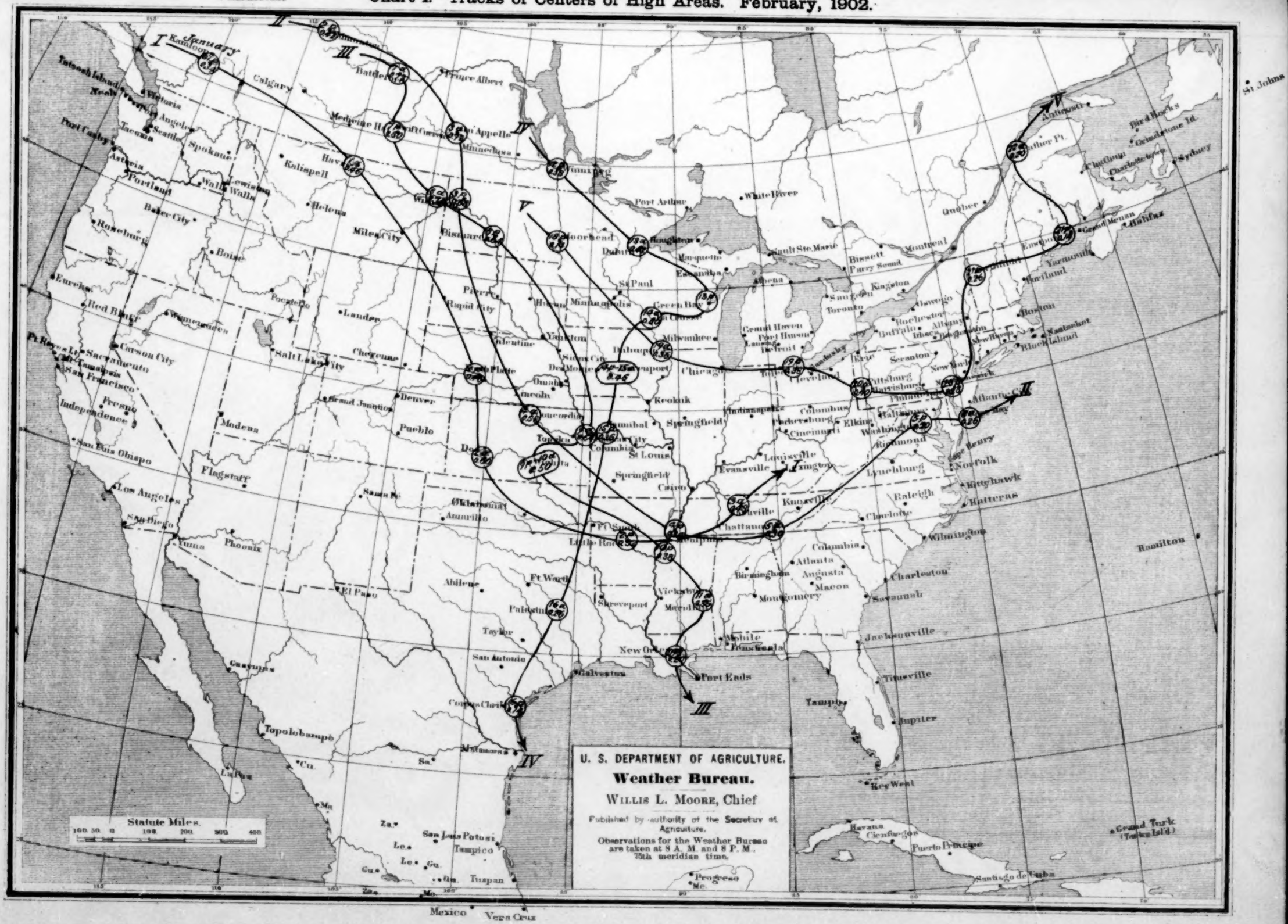
January
I
II
III
IV
V
Kamloops
Calgary
Prince Albert
Battleford
Medicine Hat
Qu'Appelle
Minnedosa
Winnipeg
Port Arthur
White River
Moorhead
Duluth
Marquette
Sault Ste. Marie
Bismarck
Pierre
Rapid City
St Paul
Minneapolis
Green Bay
Milwaukee
Dubuque
Chicago
Davenport
Omaha
Lincoln
Keokuk
Denver
Grand Junction
Pueblo
Springfield
Columbus
Indianapolis
Cincinnati
Pittsburg
Harrisburg
Philadelphia
Atlantic City
Baltimore
Washington
Richmond
Norfolk
Cape Henry
Hatteras
Lynchburg
Raleigh
Charlotte
Knoxville
Chattanooga
Memphis
Little Rock
Cairo
St Louis
Evansville
Louisville
Lexington
Abilene
Ft Worth
Shreveport
Vicksburg
Meridian
Montgomery
Atlanta
Birmingham
Augusta
Macon
Columbia
Charleston
Savannah
Wilmington
Jacksonville
Mobile
Pensacola
New Orleans
Port Eads
Galveston
San Antonio
Taylor
Corpus Christi
Brownsville
Tampico
San Luis Potosi
Topolobampo
La Paz
Mazatlan
Guaymas
Yuma
Phoenix
Flagstaff
El Paso
Albuquerque
Santa Fe
Amarillo
Oklahoma
Ft Smith
Los Angeles
San Luis Obispo
Fresno
Independence
Modena
San Francisco
Sacramento
Red Bluff
Eureka
Roseburg
Portland
Astoria
Tacoma
Seattle
Spokane
Walla Walla
Lewiston
Baker City
Boise
Pocatello
Helena
Miles City
Kalispell
Port Crescent
Port Townsend
Victoria
Tatoosh Island
Neah Bay
Port Canby
Carson City
Winnemucca
Salt Lake City
Chegenne
Lander
Valentine
Yankton
Sioux City
Des Moines
Huron
Rapid City
Pierre
Havre
Swift Current
Battleford
Prince Albert
Calgary
Kamloops
Father Pt
Antigonish
Bird Rocks
Grindstone Id.
Chatham
Charlottetown
Sydney
St Johns
Quebec
Montreal
Ottawa
Kingston
Toronto
Sarnia
Parry Sound
Bissett
Huron
Erie
Buffalo
Rochester
Albany
Syracuse
Scranton
New York
Boston
Nantucket
Block Island
Portland
Yarmouth
Halifax
Grand Manan
Eastport
Bangor
Lewiston
Detroit
Cleveland
Toledo
Port Huron
Grand Haven
Escanaba
Green Bay
Milwaukee
Chicago
Duluth
Moorhead
Bismarck
Miles City
Helena
Kalispell
Havre
Swift Current
Battleford
Prince Albert
Calgary
Medicine Hat
Qu'Appelle
Minnedosa
Winnipeg
Port Arthur
White River
Hamilton
Key West
Tampa
Titusville
Jupiter
Havana
Cienfuegos
Puerto Principe
Santiago de Cuba
Grand Turk (Turks Isld)
Progreso
Tuxpan
Tampico
San Luis Potosi
Mazatlan
Topolobampo
La Paz
Guaymas
Yuma
Phoenix
Flagstaff
El Paso
Abilene
Ft Worth
Taylor
San Antonio
Galveston
Port Eads
Corpus Christi
Brownsville
Shreveport
Vicksburg
Meridian
Montgomery
Atlanta
Birmingham
Augusta
Macon
Columbia
Charleston
Savannah
Wilmington
Jacksonville
Mobile
Pensacola
New Orleans
Titusville
Tampa
Jupiter
Key West

Chart II. Tracks of Centers of Low Areas. February, 1902.

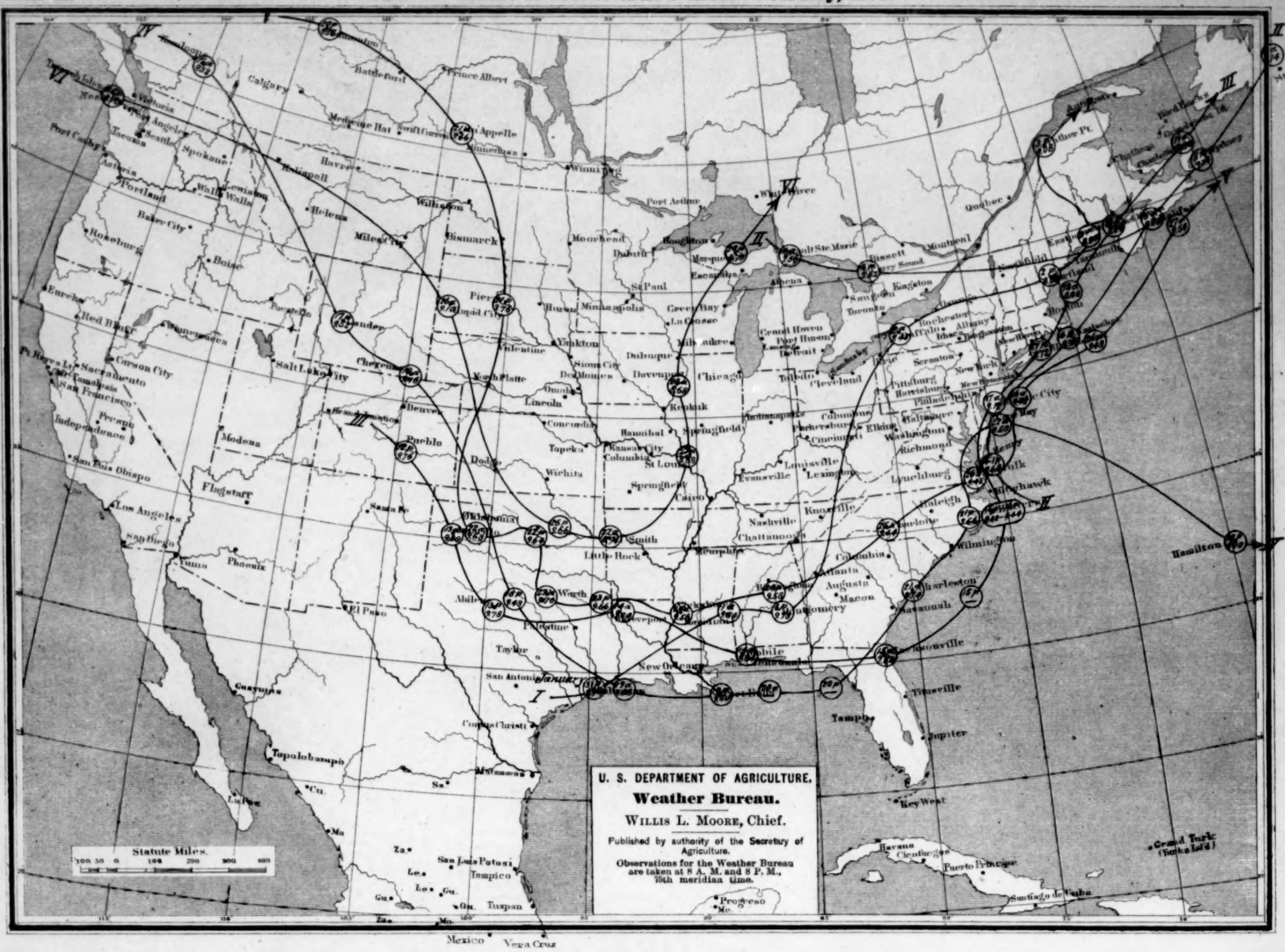

Chart III. Total Precipitation. February, 1902.

Chart III. Total Precipitation. February, 1902.

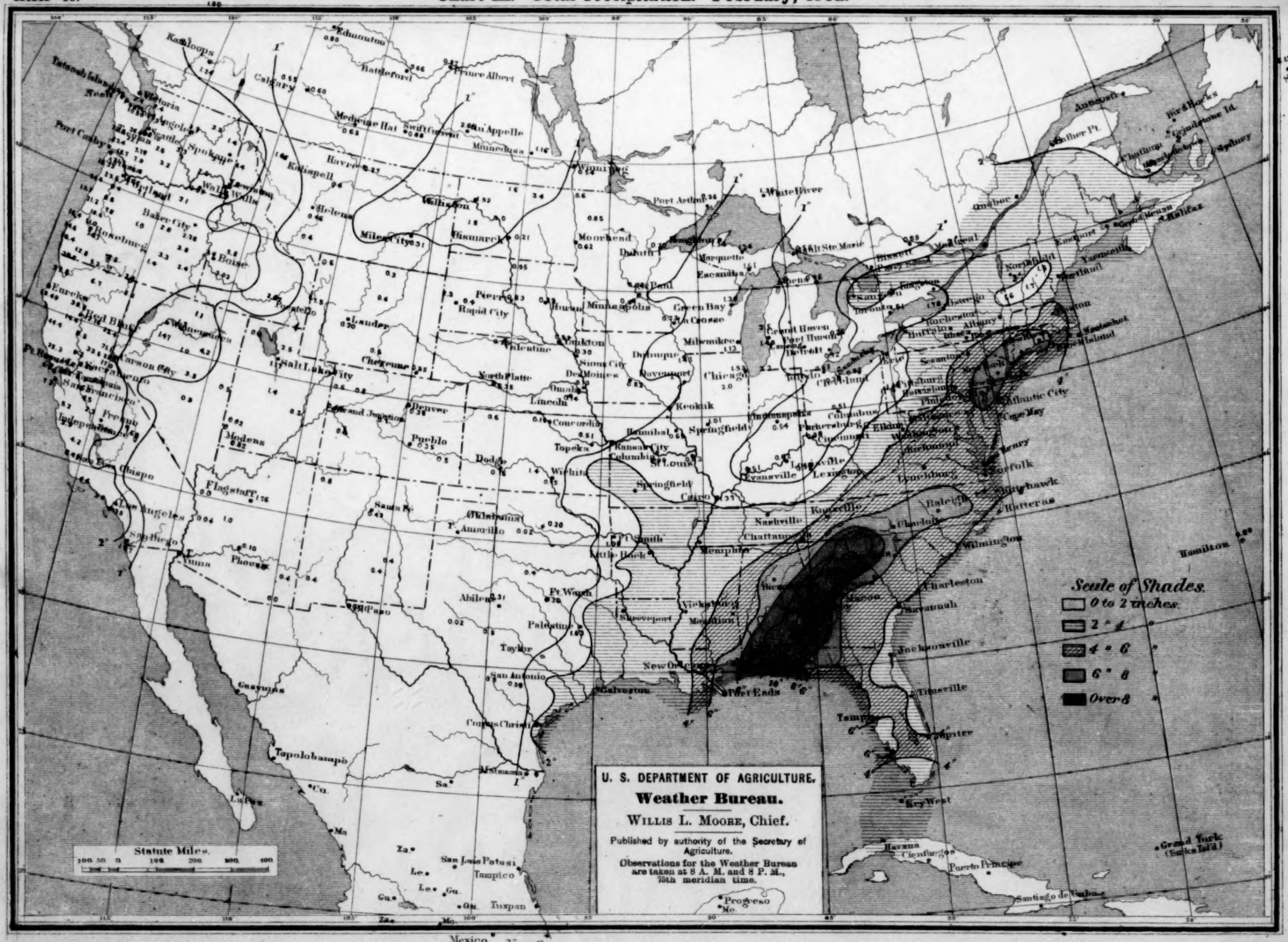

Chart IV. Sea-Level Pressure; Resultant Surface Winds. February, 1902.

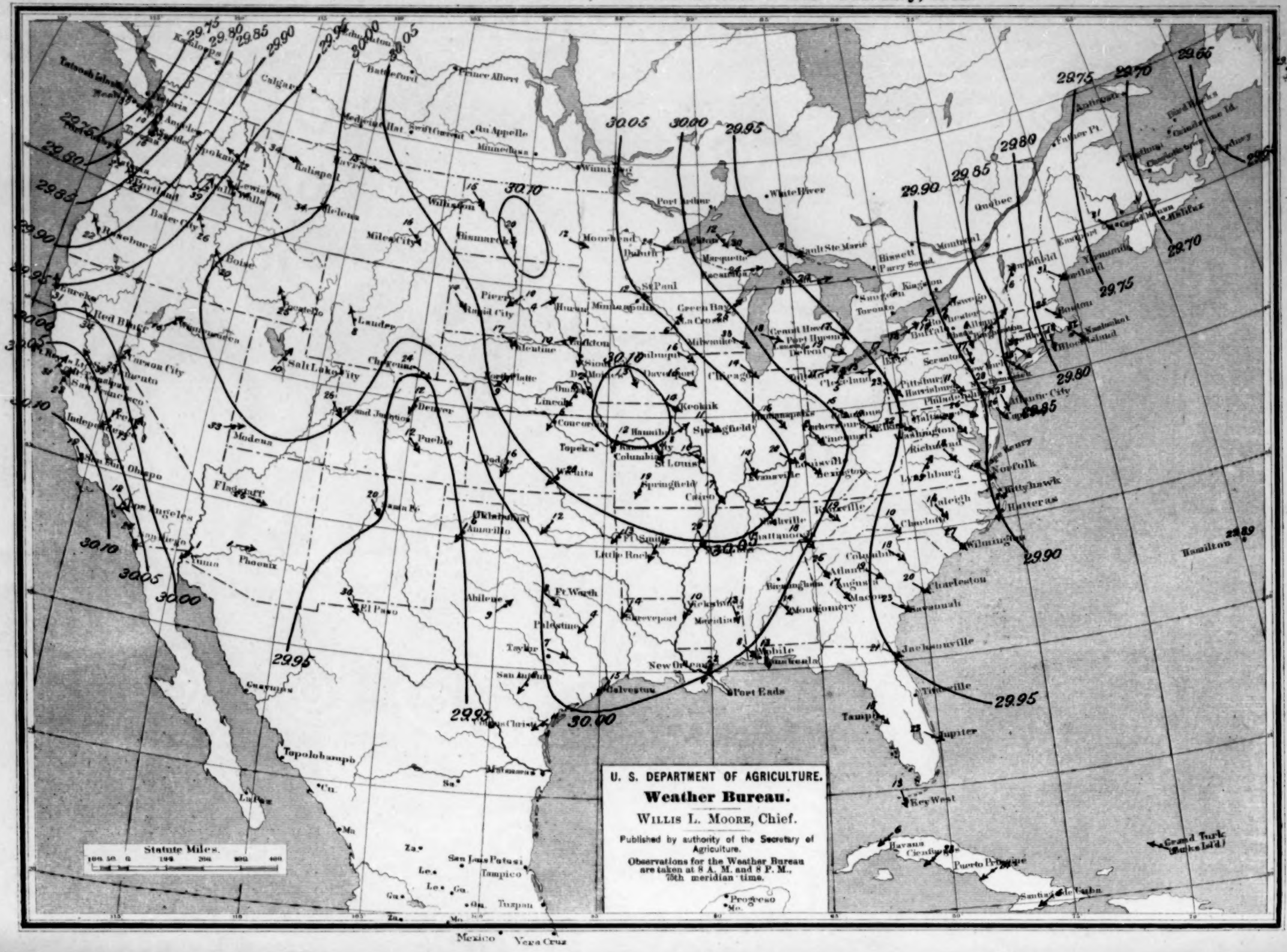

Chart V. Hydrographs for Seven Principal Rivers of the United States. February, 1902.

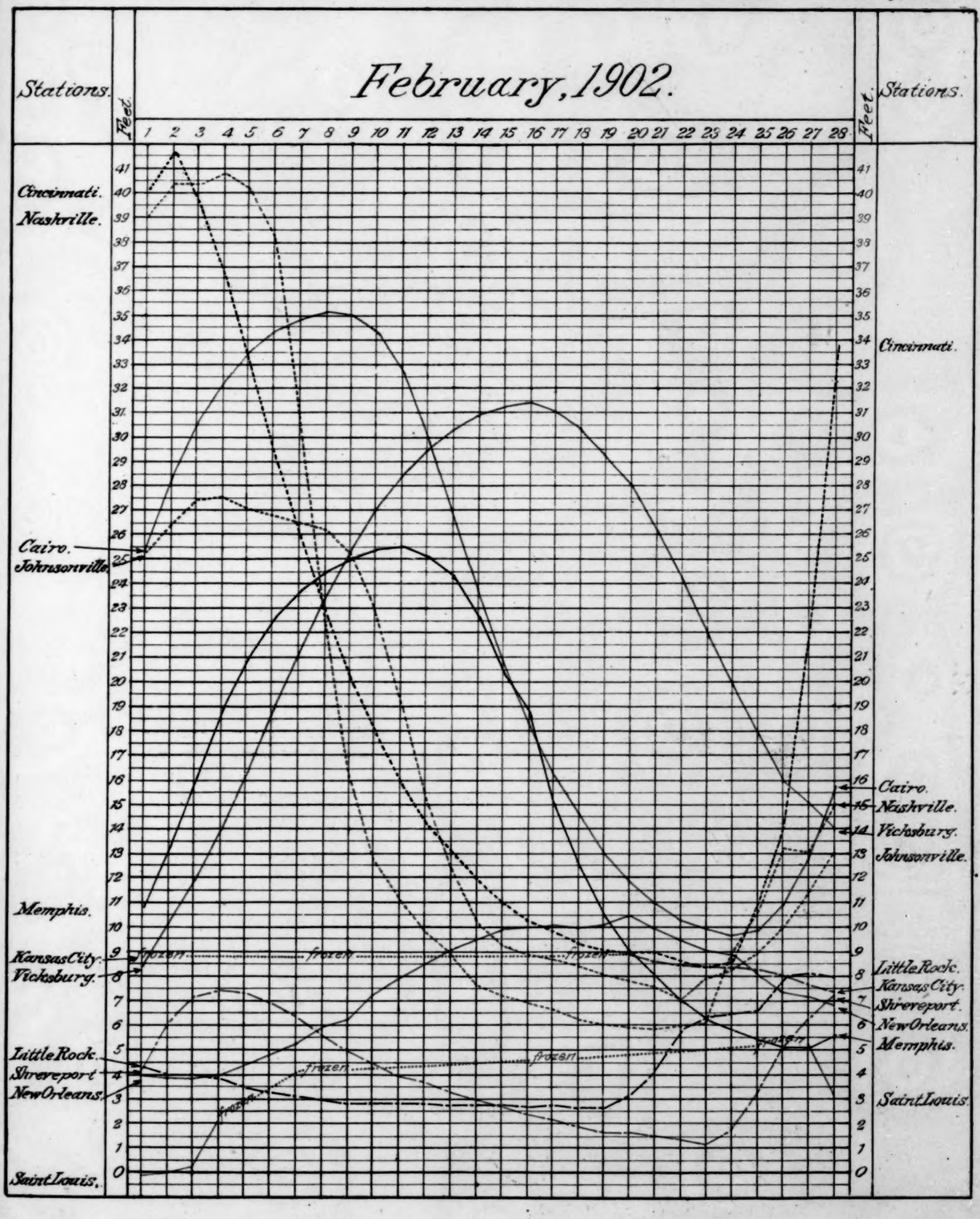

Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. February, 1902.

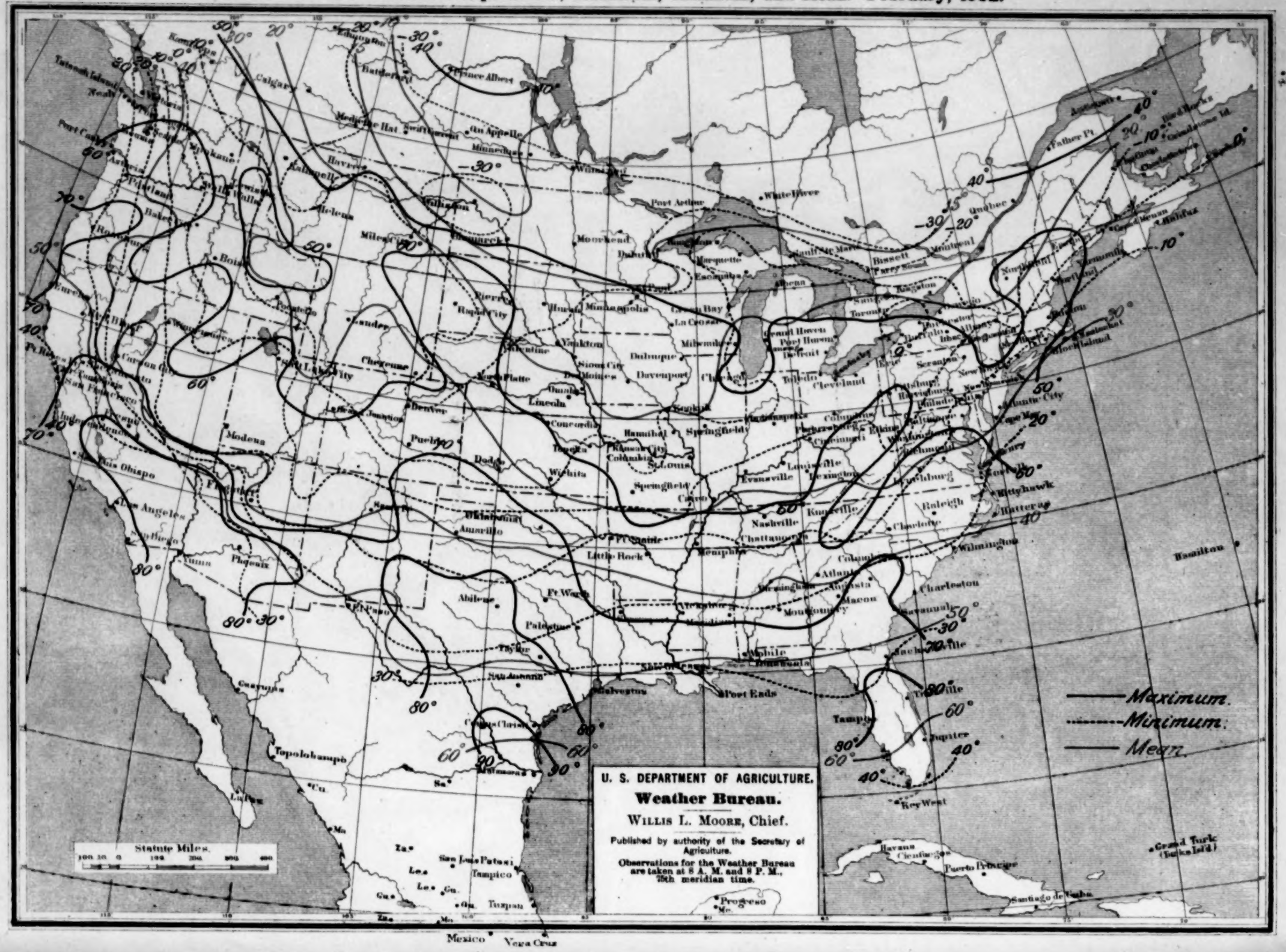
Maximum.
Minimum.
Mean.
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
WILLIS L. MOORE, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th meridian time.
Statute Miles.

Chart VII. Percentage of Sunshine. February, 1902.

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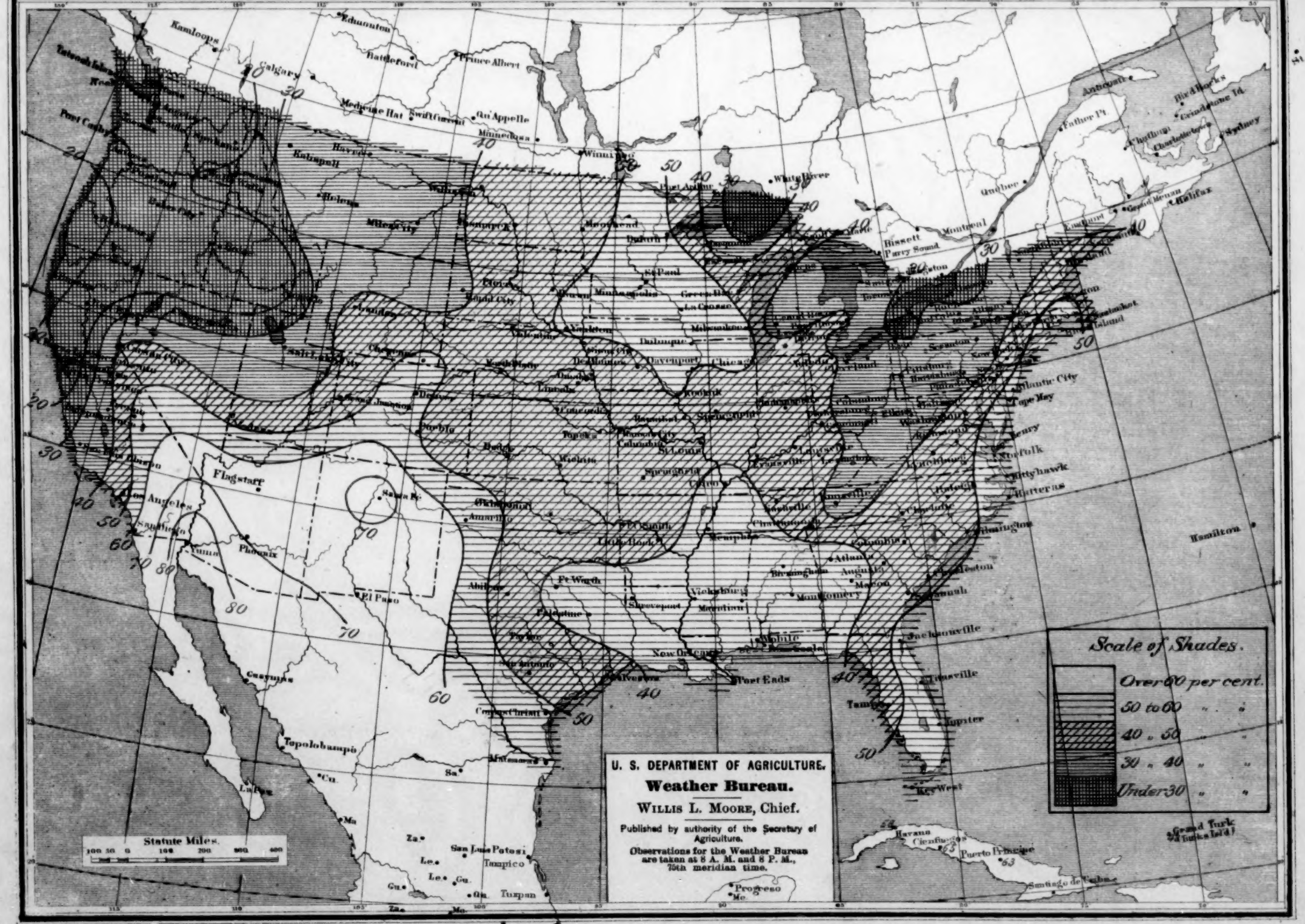


U. S. DEPARTMENT OF AGRICULTURE.

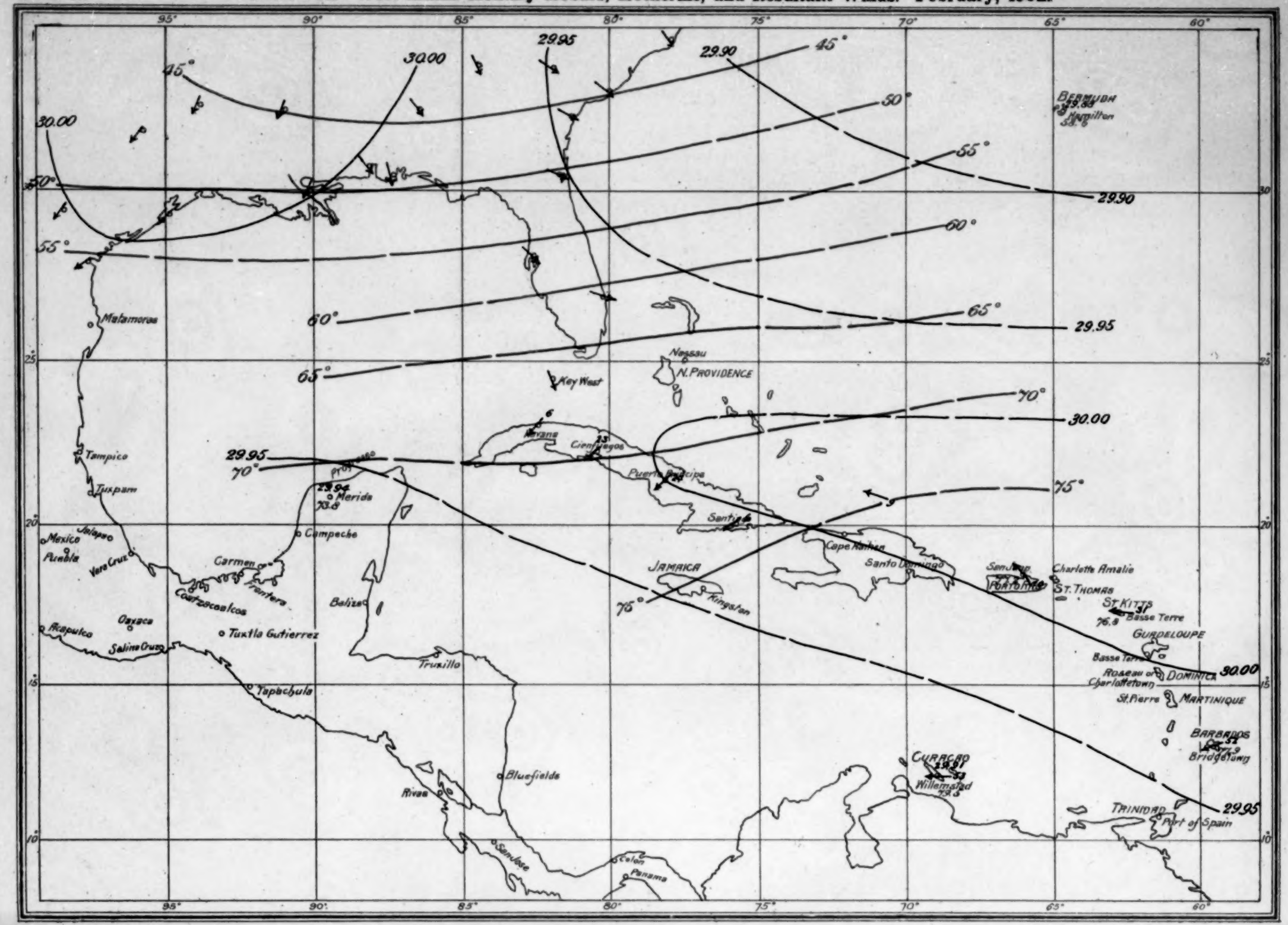
Weather Bureau.

WILLIS L. MOORE, Chief.

Published by authority of the Secretary of Agriculture.

Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th meridian time.

Chart VIII. West Indian Monthly Isobars, Isotherms, and Resultant Winds. February, 1902.



XXX—19.

• Barkerville

Chart IX. Total Snowfall for February, 1902.

Chart IX. Total Snowfall for February, 1902.

Chart X. Depth of Snow on Ground on February 28, 1902.